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INVESTIGATING TEACHER PERCEPTIONS ON  
SCHOOL GARDENING PROGRAMS

By

Jennifer Emily Tinker

A Dissertation in Practice

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Education

Doctoral Program in Educational Leadership at Lynn University,

College of Education

Lynn University

2012

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## ABSTRACT

The primary objective of this study was to evaluate the potential of school-garden programs in three specific sights in Palm Beach County Florida. This study was designed to guide the development of a “curriculum model” for Garden Based Education (GBE) in School Settings. The justification was due to the fact that; there is a lack of GBE curriculum serving Palm Beach County. Schools are not held accountable to teach environmental education, as there are no Florida standards in the area of eco-literacy and sustainability.

A theoretically-constructivist, conceptual framework for developing and evaluating behaviorally based, school-garden programs, was designed. Data collection methods for this study included the triangulation of online surveys, participant interviews, and field observations. The researcher used grounded theory, focusing on axial coding, to address themes related to environmental awareness, nutrition and academic enhancement. This allowed there to be naturalistic generalization throughout the case study.

The findings revealed that teacher’s perceptions of Garden Based Education (GBE) are positive and essential in the integrated systemic interventions within an identified triad of domains. The strongest areas of perception with regard to academic enhancement lay in social studies and science. However, the findings stressed that teachers lacked sufficient professional development and time to utilize the GBE models.



## **ACKNOWLEDGEMENT**

First, I would like to thank both my sponsors Baytree Designs and the members of my school faculty and staff for being supportive, understanding and curious about this endeavor. I would like to thank the patient and willing participant teachers in the study. Being part of a progressive and cohesive learning environment has made all of my hard work possible. Baytree Design kept my focus on the importance of the findings and made the data relevant. Palm Beach Day Academy provided me with a canvas to see the theories come to fruition and gave me an opportunity to work with teacher participants in the field, who made this thesis possible.

I would like to thank my dissertation committee, specifically Dr. Adam Kosnitzky for his patience and guidance throughout the entire compilation of research, and Dr. William Leary for his belief in me. I also greatly appreciate and acknowledge Dr. Valerie Storey for her extensive knowledge in the process and relevance of an Ed.D. Degree.

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## **Chapter I: INTRODUCTION**

### **Background Information**

As natural resources diminish and national health concerns rise, the need for educated problem-solvers becomes requisite. Teachers provide a pathway to enhanced knowledge. Essential knowledge is that which is needed for an individual, a community and a culture to succeed (Abbott, 1998). Garden Based Education (GBE) provides access for multiple intelligences to flourish, given its multi-fold use. The perception of teachers in the field with regard to well-developed curriculum and innovative tools is as essential as the tools themselves (Reichert, 2010).

Several states have led the way in the newfound school garden movement. These states, such as California, are looking at ways in reversing the trend toward obesity in the United States (Brenner & Pusey, 1999). California's politicians were involved in the publication of the California Department of Education's brochure, *Nutrition to Grow On* (C.D.E. 2012), an activity guide linking nutrition education to garden based education. This included a section, *Kids Cook Farm-Fresh Food*, featuring classroom activities and anecdotes from regional farmers. The cohesive collection of all these documents, *A Child's Garden of Standards*, was adopted by the State of California, linking specific standards to core subjects. This exemplifies a possible model for states that currently have no curriculum design.

The benchmarks, standards and expectations incorporated into California's education framework provided guidelines for a lens the researcher used to look into "outdoor" learning environments. Exploring the effects of using environmental

integration contexts across the elementary curriculum became a focus of the researcher and Baytree Design, a landscape architectural firm specializing in schoolyard to ecosystem gentrification. Baytree Design requested teachers' perception of the importance of their "Asphalt to Schoolyard" program to be analyzed. They wanted to know what the teachers' perspectives were in the domain of outdoor learning spaces, including a school garden curriculum. The researcher was asked to compile data in this realm.

Global conservation and sustainable development strategies attempt to recognize biodiversity as critically integral to life on earth. The 1992 United Nations Conference on Environment and Development, had 192 countries attend, plus the European Union (Estrella-Faria, 2009). Teaching future generations how to handle environmental crisis as well as understanding the nutritional significance of grown food, is at the core of Garden Based Education Programs. The goal in a Garden Based Education program (GBE) is to provide assessment tools that address multiple intelligences and provide outdoor laboratories to be used across all disciplines.

## **Background**

Gardening was a national pastime in the Gilded Age (1877-1897) and Progressive Era (1887-1917); "school" gardens enjoyed immense popularity. The United States Department of Agriculture estimated that there were more than 75,000 school gardens by 1906. As their popularity soared, advocates busily supplied a body of literature about school gardening and agricultural education (Golley, 1998).

Louise Klein Miller's *Children's Gardens for School and Home*, a Manual of Cooperative Learning appeared in 1904, as the school garden movement was gaining

momentum in the U.S., Miller's book described two primary purposes of children's gardens: civic beautification and nature study, with the goal of inspiring appreciation that would ultimately influence their civic character (Daily, 1997). Miller clearly saw educational purposes for children's gardens; in her acknowledgements Dr. William T. Harris, then the Federal Bureau of Education Commissioner was closely associated with the GBE movement, he supported various agricultural causes and actively supported the efforts made on national levels (Daily, 1997)

Miller's book argued that school gardens were not a "new phase of education," but rather, an "old one" that was gaining merit for its ability to accomplish a wide variety of needs (Daily, 1997). School gardens were a way to reconnect urbanized American youth with their agrarian, producer heritage, the Jeffersonian farmer model. Miller points out that school gardens could help immigrant children, as well. Miller also argued for the importance of gardening education and nature study enhancing both urban and rural youth-education, in sociological and economic realms. Miller's GBE emphasis with urban youth, was to teach "children to become producers as well as consumers," and for the possibility "of turning the tide of population toward the country, thus relieving the crowded conditions of the city" (Daily, 1997).

Other reformers echoed this idea, including Riis, who said, "The children as well as the grown people were 'inspired to greater industry and self-dependence.' They faced about and looked away from the slum toward the country (Riis, 1911)." Maria Louise Greene's "Among School Gardens", also became a standard book in the literature; it addressed the purposes of school gardens; gave information about the best school gardens and model programs; provided detailed and practical how-to information; and shared

information about the quickly growing school garden movement in the United States. Greene's book provides a foundation for developing school's progressive reforms. "Civic beautification" is an important theme described in Greene's text. The author writes that "the underlying purpose of teaching is threefold, educational, industrial and social, or moral..." New York's DeWitt Clinton Park School founder is quoted in Greene's book, saying:

I did not start a garden to grow a few vegetables and flowers. The garden was used as a means to...teach them in their work some necessary civic virtues, private care of public property, economy, honestly, application, concentration, self-government, civic pride, justice, the dignity of labor, and the love of nature..." (Morris, Briggs, & Zidenberg-Cherr, 2000)

The school garden movement accelerated in World War I, when the Federal Bureau of Education introduced the United States School Garden Army with the conception of "Victory Gardens". During the interwar years and the Great Depression, youth participated in "relief" gardening. Since post-WWI youth gardening has experienced the dichotomy of both diminishing appeal and intense growth. During an economic down turn in the 1970's school gardening showed a renewed interest. This was regained again in the early 1990s. Interest in, farm-to-school programs have continued momentum, most notably in California where legislation has been developed to encourage school garden education (Block, Patterson, & Subar, 1992). Under the tenure of State Education Superintendent Eastin (2009), a "Garden in Every School" program began. This continued under the following superintendent, O'Connell's tenure in

California, where Assembly Bill 1535, funded school gardens (California Healthy Kids Resource Center, 2010).

**We are seeing a movement reborn.** From a local to a global perspective, schools around the world have been designing their grounds to include gardens, which embody ecological principles to teach students (Block, Patterson, & Subar, 1992). School gardens in America were a natural outgrowth of earlier community garden efforts, as well as civic and philanthropic work, conducted by women in urban settings. These gardening efforts were typically progressive in tone: they sought to correct or reform a wide range of perceived social, moral and educational agendas and advocated associative means. School gardens were one part of the broader nature-study movement. One historian listed the various names included under the umbrella of the movement; school gardens, school home gardens, children's gardens, school farms, farm schools, garden cities, and others (Lawson, 1999). The nature-study movement was developed in Germany and further extended in Swedish primary programs (Cross, 2006).

### **Statement of the Problem**

Children in contemporary school settings are losing ecological knowledge and awareness necessary for future academic achievements, nutritional understanding and environmental protection (Marshall, 2007). There are currently no national education standards for environmental studies (Langer & Piper, 1987). In addition, the United States has no benchmarks or grade level expectations. Preparation for environmental science questions, such as SC.912.L.17.8 of the Florida Comprehensive Assessment Test (FCAT) asks: Can you recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive,

non-native species? How are students meant to comprehend the significance of such a question if they have no real-world, applicable, exposure? There are no prerequisite benchmarks or standards in the preceding grades providing prior knowledge.

The U.S. has an educational climate, that, if a subject is not assessed it is not a priority; hence it is not being taught with equity (Merriam, 1985). Until school gardening is addressed as a critical need the focus on this subject area may be missed. Teachers need to understand and embrace the significance of GBE in enhancing all academic-areas of the curriculum (Orgorzaly, 1996). Additionally, The recent epidemic of obesity and related diseases in school-age children also reinforces the need to make a garden in every school an essential part of the learning environment. School gardens play a role in reversing this trend toward obesity when linked with fresh vegetables and fruit served in the cafeteria and nutrition education provided in the classroom (Morris, Briggs & Zidenberg-Cherr, 2000).

The researcher examines the literature addressing issues of ecological degradation on a global scale, climate change, loss of biodiversity, pollution of the biosphere and global and local plant consumption, as it pertains to student learning through school gardening. There are limited significant studies that benefit the current elementary curriculum, because it does not align with U.S. policy regarding socio-economic and socio-political structures of our education system, currently the U.S. curriculum is more interconnected with funding and special interest (Hines, 1987).

The survey of teacher education institutions conducted by Wolf and Cox (2007) revealed that methods courses have no framework for scientific field investigations similar to the framework provided in Windschitl et al.'s investigation (2007). Methods



courses relied on instructional models (such as 5E, SCIS, learning cycles, discovery, experimental inquiry, guided instruction, classroom environmental research, field research extensions, and field based inquiry) for developing science inquiry competence. These courses did not provide methodologies for field science investigation, within an elementary school setting, but instead relied upon the general science programs at their higher education institutions to expose future teachers to life science methodologies.

### **Research Issues**

The brevity of environmental concerns and benefits through GBE are multifold. Educational practices are ever changing to meet the demands of public need and interest. The paradigm debate is in constant flux between strengthening traditional values and introducing progressive ideas. The issues surrounding environmental awareness in children through academic learning has political, social and emotional implications. Breaking down the barriers that surround teaching in a “comfort zone”, may be the foremost issue of GBE. The need for a collective, community, climate and professional development for teachers were the first two elements discovered in the findings addressing research issues.

The researcher collected a limited number of narratives; the data was homogenous, resulting in teacher perception issues that reflected the literature review within two categories. First, lack of personal knowledge and second, lack of professional development that resulted in limited capabilities. In this study, the issues were enhanced by limited professional development opportunities and time. The literature stated that samples of gardening teachers and teachers with adequate gardening support (Graham et

al., 2004) were more enthusiastic about the potential of school gardens than were mixed samples of gardening and non-gardening teachers (Graham & Zidenberg-Cherr, 2005).

Support came in the form of enthusiastic principals and effective and credible lead teachers who promoted school gardening through contagious student excitement rather than through personal power (Vesilind & Jones, 1998). The semiretirement-lead gardener programs for teachers, with a model program in Davis (CA) public schools (Graham et al., 2004) and in Las Vegas, where surveys of principals in gardening and non-gardening schools uncovered potential problems and barriers to school gardening. This led to the hiring of a community-based instructor to provide training and coordinate the gardening program for volunteer master gardeners (O'Callaghan, 2005).

Additional studies are suggested for the implementation and operation of school gardens (Kimm, 2002). Studies have not addressed school-garden continuity or failure, but they have addressed the lack of teacher preparation for using gardens in instruction. Portillo (2002) reported that elementary school teachers with some agricultural training are more likely to use school gardens as a learning tool. Dobbs, Reif, and McDaniel (1998) reported that 98% of the 205 Virginia Kindergarten to sixth-grade teachers whom they surveyed wanted to participate in additional garden training. The researcher made suggestions that School-gardening experience, as well as botany could become a part of teachers' pre-service education. This was emphasized to the sponsor organization Baytree Design, as data that concluded teacher preparation in gardening provided a potent form of experiential education.

**Environmental Degradation.** Environmental degradation, as it pertains to the lives and wellbeing of current students and future generations is a discussion for all

educators. “There is only so much water in the world and only so much topsoil. There is only one atmosphere, so there is only so much CO<sub>2</sub> that can be stuffed into the atmosphere. Real change occurs when people make choices. We are not going to get out of the predicament that we are in by incremental actions. According to Senge (2008), “It is going to take bold ideas”.

Questions of how to teach and assess environmental education were asked by the former Director of Education at Florida’s Pine Jog Environmental Education Center, Susan Toth. “Teachers are overburdened, we cannot expect them to add one more thing to their curriculum plates. But we can use environmental education to manage what is already on their plates and make it more manageable” (Toth, 2010). Environmental degradation is a result of the dynamic inter-play of socio-economic, institutional and technological activities.

Environmental changes may be driven by many factors including; economic growth, population growth, urbanization, intensification of agriculture, rising energy use and transportation. Poverty still remains a problem at the root of several environmental problems (Grimier & Krishna, 1993). Understanding the link between population and environmental impacts on local and global societies, primarily through the use of natural resources and production of wastes, is associated with environmental education. Stresses like loss of biodiversity, air and water pollution and increased pressure on arable land are all aspects of Garden Based Education.

The researcher discovered that educators at the Pine Jog Environmental Center have created eleven partnerships with Palm Beach County schools, both public and private, through the Green School Alliance Initiative (GSAI). The results of these diverse

schools that have taken up the challenge for systemic change has provided the following: problem solving techniques, organized activities, developed curricula, multi-disciplinary instructional units and environmental themes.

The researcher in this study collected several teacher-reports that supported student's engagement and enthusiasm about learning academically in outdoor settings through the GSAI. Teachers reported to be taking more of a leadership role in school change across Palm Beach County (Glenn, 2010). Students addressed real world issues and participated in experimental lessons that engaged all their senses seeking to obtain life-long learning and having a greater understanding of sustainability. This instructional approach of educating was an example of using the environment as an integrated context for learning (Lieberman & Hoody, 1998).

The use of facility grounds and surrounding environments, sought to aid in student awareness of the community. The school gardens that were used to collect data in the researcher's study; were designed as focal points by instructors to integrate subject area knowledge and skill development. Current events, social studies and real world issues were academic motivators and important learning aspects interrelated to GBE. The, "Do Nothing, Do Something" framework works well as a tool in the GBE design (see Figure 1.1).

	Global Warming isn't real	Global Warming is Real and Anthropogenic
Do Something	We gain energy efficiency, cleaner air and water, less dependency on oil/gas, more sustainable futures. There are some costs to this, however there are also jobs and other economic incentives.	We gain all of the benefits to the left, plus we might eliminate or greatly reduce the catastrophic events that could happen if we continue to warm, like floods, hurricanes, tornadoes, droughts. There will also be a significant amount of human suffering avoided, like starvation, famine and war.
Do Nothing	We may not have to worry about climate change, but we'll still have peak oil, we'll still have air and water pollution from burning fossil fuels, and we'll still have economies and nations willing to go to war or sell themselves out for oil.	In addition to facing threats of increased weather phenomena and human suffering listed above, we will probably have to face a peak oil crisis too. That is, if anyone is able to worry about gas prices while starving, and dying of dehydration or fighting water wars.

*Figure 1.1* Perceptions across matrix as taken from a study of pre-service teachers' self-efficacy: Teaching Students who are Socially, Culturally, or Linguistically different, presented at the annual meeting of the American Educational Research Association, New York, NY. (Saldaña, 2003).

**Nutrition.** With children's nutrition under assault by fast food and junk food industries, and with only about one-fourth of Florida adults eating recommended quantities of fruits and vegetables. Florida's 10-17 year-olds are reported to be overweight or at risk for being overweight (Kiefer & Kemple, 2009). School gardening offers children opportunities for outdoor exercise while teaching them a useful skill. Gardens containing fruit and vegetables can also help to revise attitudes about basic foods. There is mounting evidence that active learning in less structured, participatory spaces like gardens is more likely to transform children's food attitudes and habits, and that school gardening, especially when combined with a healthy lunch program or nutritional education, encourages more healthful food choices (Barlow, 2010). Students

are more likely to try eating vegetables they have grown themselves and to ask for them at home (Morris & Zidenberg-Cherr, 2002). When students take their preferences back to their families, they can help to improve family consumption choices (Dennison, 1998).

The researcher found that when sustainability efforts involve the whole school community, the changes in structures and relationships were accepted and more readily sustained (Marshall, 1998). Student achievement depended as much on the vitality and health of the whole school environment as on the textbooks, curricula, and teachers. The literature review provided data that showed school-culture was often the driving force behind student's motivation to learn. The researcher collected statements by educators interested in schooling for sustainability. The sample population stated that a garden is often a great starting place. A select participant said, "even a small plot or container garden can help children learn basic ecological principles first-hand. Especially in cities, a garden may be a young person's best connection to the natural world".

**Enhanced Curriculum Development.** The research stipulated a need to explore new curriculum designs for classroom instruction. Baytree Designs and Healthy Kids Healthy Communities, a national program of the Robert Wood Johnson Foundation, are seeking to find by 2013. This GBE study investigates redeveloping models and ways of thinking and learning about ecological issues within school gardens. Changing the paradigm of what education is, or needs to produce is at the forefront of what is missing. To conceptualize local, national and global change is to make necessary inferences as an educated individual (Kalik, 2011). Taking what is learned and incorporating it into real world application is essential to progress. The data that was collected for Baytree Design, the sponsor for this study, has further potential for Healthy Kids Healthy Communities as

a follow up study, which was suggested by the Palm Beach chapter and its lead director Erica Whitfield.

**Thinking Forward.** Part of the American Association for the Advancement of Science's Project 2061 is to bring science literacy to the United States. Using the "Atlas", a collection of conceptual strand maps and commentary that show how students' understanding of GBE-related ideas and literacy skills in; science, mathematics, and technology developed from kindergarten through 12th grade. The data collected in this study on school gardens provided a piece of the puzzle in reaching the completion of "Atlas". The tagline for the U.S. government's youth gardening program in World War I: "A Garden for Every Child - Every Child in a Garden" provided the possible supplement to school laboratories (Shilts, Horowitz & Townsend, 2004). However, the post Industrial Revolution model of educating was a design concerned with producing a work force for industry not a cognitive society (Hayden-Smith, 2006). The literature review points out how national educational programs may need to be revisited, possibly as mandated curriculum that promotes an understanding of nutrition and sustainability, which would allow for student understanding, motivation and academic success (Orr, 2009).

### **Experiential Education / Constructivist Approach**

The researcher made recommendations for essential questions to guide standards in the provenance and development of integrated environmental benchmarks. These standards could enrich the national science curriculum and enhance learning across all disciplines. Because environmental-education is not an "assessed" core subject in the U.S., the emphasis on ecology is not currently a consideration of teacher accountability and high stakes testing. Therefore school gardening curriculum programs are not a

priority in many national and local schools. However, in 2002 the state superintendent of public instruction for the state of California, referred to several tasks left “undone”; The coordination of educators, agriculturists and environmentalists to develop programs encompassing more research in the schools of education to help quantify the results of garden based education lead the desire to develop fully integrated garden based education into all core subjects and resources. These tasks helped to guide the formation of the conceptual framework of this thesis.

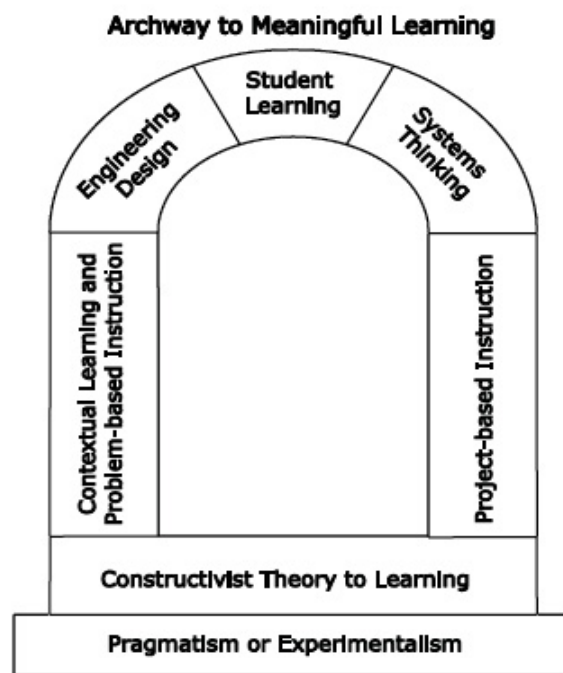
### **Leading by Example**

The school garden movement has shown how it has played a role in reversing the trend toward obesity in the United States (Bremner & Pusey, 1999). Therefore one California district superintendent and other politicians were involved in the publication from the California Department of Education’s, *Nutrition to Grow On*, an activity guide linking nutrition education to garden based education. The guide resulted in the Kids Cook Farm-Fresh Food, featuring classroom activities and anecdotes of actual regional farmers. The cohesive collection of all these documents, A Childs Garden of Standards, was adopted by the State of California, linking specific standards to core subjects. This exemplifies a possible model for regions across the United States (U.S.).

The benchmarks, standards and expectations incorporated into California’s education framework are inclusive to the use and dependence on “outdoor” learning environments. By exploring the effects of using environmental integration contexts across the elementary curriculum, the researcher and sponsors wanted to know what the teacher’s perspectives are in this domain. Garden Based Education provides an experiential learning tool (see Figure 1.2). GBE is a process through which a learner



constructs knowledge, skill and value directly from an experience within the garden environment. Content learning within the garden occurs when carefully constructed curriculum enhances, anticipation, reflection, critical analysis, and synthesis (Marlow, 2009). Garden experiences were structured to guide the student/learner to take initiative, make decisions and to be accountable for actions and results. Teacher perceptions were based on both observation of their students as well as assumptions of student outcomes.



*Figure 1.2* An archway to meaningful learning, through a constructivist approach (Kelly & Kellam, 2009).

### Conceptual Framework

The conceptual “framework” presented for the research on teacher perceptions of GBE, articulated the researcher’s understanding of teachers’ perceptions based on existing research. The scope and nature of education in eco-literacy, nutrition, and academic enhancement is intended as a guide to the next step, which is the process of

developing garden based standards for all students. Thus, it described the major practices, crosscutting concepts, and disciplinary core ideas that teachers consider important. This provides an outline of how these practices, concepts, and ideas could be developed within a constructivist theoretical design.

Ecological investigations were featured alongside the physical sciences, life sciences, and earth and space sciences for two critical reasons: to reflect the importance of understanding the human-built world (as agrarian societies developed) and to recognize the value of better integrating the teaching and learning of environmental science, nutrition and cross-curricular learning through observability. The framework was a broad description of the content and sequence of learning expected of all students by their teachers. This document lays out the framework which is intended as a guide for “standards” developers; as well as, curriculum designers, assessment developers, state and district administrators, professionals responsible for teacher professional development, and finally, educators working in informal, field, settings.

### **Framework Strands**

The conceptual framework for this study was designed in three strands represented in Garden Based Education literature:

1. Environmental degradation is a critical concern to education, globally. GBE addresses a greater understanding in the area of ecology and emphasizes global competencies;
2. Distributed GBE definitions, frameworks, theories and perspectives from theorists on nutritional understanding through GBE;

3. Empirical research studies investigating the existence of academic enhancement effects of GBE in contemporary practice settings; and
4. Perspectives of teachers in the field of GBE.

### **Purpose of the Study**

The primary purpose of this qualitative study was to investigate teacher's perceptions of GBE as it impacted elementary school students. The study guided the development of a "model" for school garden programs. The concept lay in schooling that is "smart by nature" (Kiefer & Kemple, 2009). It included experiencing the natural world; learning how nature sustains life; nurturing healthy communities; recognizing the implications of the ways we feed and provision ourselves; and knowing the places where we live, work, and learn. Teachers are in a prime position to be able to incorporate these basics throughout the curriculum at every grade level.

This study specifically looked at elementary school aged children in the fourth grade. The desired outcome of the study was to evaluate the potential of school-gardening-education and eco-literacy interventions, as they address important issues related to environmental degradation, childhood-nutrition and academic motivation, through enhanced lesson design. A theoretical framework for a school gardening program was developed, which would further improve curriculum development and evaluation.

The researcher investigated whether school garden programs influenced the importance of the preceding issues. The study gathered qualitative data from personal interviews of randomly selected teachers within a school setting. The concept of a sustainable community was the general topic conducted by the researcher. The findings sought to effect systemic reform across all academic disciplines. The researcher looked at

ecological degradation on both a local and a global scale within the review of the literature. Exploration of new curriculum design for classroom instruction assisted in redeveloping models and ways of thinking and learning about ecological issues (as they pertained to elementary aged students) utilizing school gardens. Climate change, loss of biodiversity, pollution of the biosphere and global and local plant consumption, as it pertained to student learning through school gardening was pertinent to the data collection of all the teachers' perceptions.

While there are no multi-national or U.S. standards for environmental studies, Florida does have standards in Biology and Earth Science that relate to ecology. However, the United States has no established benchmarks or grade level expectations for environmental studies (Orr, 2009). Tilbury, a global environmental education consultant, emphasized the gap in documentation, "No document to date translates the goals of environmental education for sustainability, or outlines the approach and guidelines for philosophies in schools" (Golley, 1998). This comment emphasizes the purpose and urgency for local and global research.

### **Research Questions**

Acknowledging the aforementioned research problem, the following questions were designed as specific points of entry to this study:

1. Do teachers perceive students participating in school garden programs as having a better understanding of the changing conditions and degradation within global environments?
2. Do teachers perceive students, participating in gardening, as comprehending the importance of nutrition and sustainability?

3. Do teachers perceive that students demonstrate greater motivation in multiple disciplines, with the enhancement of school gardening?

### **Rationale of the study**

The researcher investigated the use and purpose of school gardens. The results were multifold; gardens provided a place where youth learned natural sciences (including agriculture) acquired mathematical concepts, and vocational skills (Alexander, North & Hendren, 1995). These metacognitive skills were valuable in a multiplicity of areas in the education setting (Gardner, 1999). The very multiplicity of uses and purposes for gardens made it difficult for gardening proponents to firmly anchor gardening in the educational framework and a school's curriculum. The literature review points out that living in balance with our environment has been an imperative as long as humans have been on Earth. In the formalized education systems, over the past several decades, there has been growing focus of ecology and environmental education. The presence of diminished natural resources and the increase of environmental degradation across the planet has ignited a need to educate children around the globe (Rice, 2007). However, the developed world has been able to abstain from direct contact with the most severe areas of degradation and many U.S. students are unaware of the long-term effects (see Figure 1.3).



*Figure 1.3 Areas of severe degradation, Gnanapragasam & Sivipalan (2008).*

The relationship of teacher's perceptions to GBE in schools provided direction for the methodological rationale of this study. The assumption that the introduction of environmental education, through hands on gardening, engages teachers in practices they (themselves) can build understanding from, out of practical theories or an amalgam of personal knowledge. This epistemological view was the interplay of pedagogical knowledge, between the social, cultural, and educational context with that of the personal. This methodological stance drew on the assumption that certain forms of inquiry were better suited to young learners, then others. The implication suggested teachers have a desire to implement studies in non-core areas.

The reality of the study was a challenging task, to have teacher's views incorporated into the conceptual categories of environmental education as an interdisciplinary teaching tool. The collection of data helped to problematize the current discourse. However, national and district support is essential to truly effecting change.

This support has not been prevalent to date. The need to recognize ecology as a core requirement is critical to an advancement in sustainability comprehension.

Multi-cultural influences as a symbolic locus of school pride and spirit in education were found in GBE. Gardening offered the schools a way of helping children to identify with their community and to feel proud of their own individual contribution. Children knew which plants they helped to grow, and they felt pride in that accomplishment as well. The data implied an improved school spirit, and teachers reported children's attitudes toward the school were more positive. "An environment-based education movement--at all levels of education--will help students realize that school isn't supposed to be a polite form of incarceration, but a portal to the wider world" (Louv, 2005).

### **Assumptions**

The GBE educators that were selected for this study were selected because of their involvement with a school garden. The following assumptions were made:

1. All participants in the study would answer the questions openly and honestly.
2. The GBE educators who participated in the study paid close attention to the student's nutritional consciousness, prior to, and after, the use of the garden as a learning tool.
3. The perspectives, beliefs, and practices of GBE educators with enhanced environmental understanding can be identified.
4. The perspectives, beliefs, and practices of GBE educators who participated in the study, would benefit other GBE educators in cross-curricular academic planning.

This study was done with the assumption that all participants would truthfully identify their ethnicity, educational background, and professional status and would correctly answer all questions in the interview. Information such as perceptions, awareness, and attitudes of respondents (GBE) toward the issue of pollution, nutrition and academic enhancement, help explain the differences in the participants responses. Because the study only involved educators who participated in schools with gardens, there was an assumption that a bias may exist because all the educators were invested in GBE.

### **Scope and Delimitations**

This grounded theory case study was researchable because, imbedded in the qualitative survey are scientific questions containing measurable variables; age, gender, educational experience, as well as teaching, namely current events and history (Gerring, 2004). The participants identified their bias in this manner as well. Questionnaires raised the importance of “how” the results “came-to-be”, not just what the outcomes were. The narratives provided information resulting in a measurable value. Therefore the program itself was as a variable, made up of numerous sub-variables; cause, time-on-task, classroom setting (outdoor-setting), and student to teacher ratio.

This study was delimited to a small sample population. The methodology and measurement tools were specific to the delimitations in the demographic make-up. The sample population was predominantly female, the age range was between 29-51, and the setting consisted solely of elementary schools in a small regional Southeast Florida location. The study will be delimited to examination of teachers' perceptions when teaching a garden based lesson.



The participants were interviewed about their beliefs and convictions in science and health lessons, interacting with their actual school gardens and participating activities. The activities that were reported were delimited to planting, tending, harvesting garden-grown produce, and participating in community events, for an average of thirty minutes a week over a three month period. The researcher did not witness the initial planning and construction stages, but did gather the perceptions from these stages.

A control school did not participate in gardening activities. As part of a pre-post panel study, approximately twelve fourth grade teachers completed the Garden Frequency Questionnaire. Twelve personal interviews conducted with teachers, provided cross-coded data through a synthesis of research findings together with a review of the literature. The researcher could not anticipate dropout-participants from the study. Major delimitations to the research design were confined to homogeneous settings and not implemented into other socio-cultural and socio-economic locals, and will require replication of results.

This study was both feasible and able to be implemented within a reasonable amount of time, subjects were available. Concepts in the theoretical framework were measurable through cross-coded interview question results, collected from recorded dialogue. The primary purpose of this study was to evaluate the potential of school gardening education (SGE) eco-literacy interventions, which addressed important issues related to childhood-nutrition and comprehension of local, national and global environmental issues.

A theoretical framework for school gardening programs will further improve curriculum development and evaluation. This study will gather qualitative data conducted

by personal interviews of the selected teachers within a school setting on the concept of a sustainable community.

### **Definition of Terms**

The following terms referenced in the study were definitions developed through the review of the literature, as presented in Chapter 2, as well as the researcher's use or explanation of the constructs as they relate to the study. The definitions for the purpose of this study were as follows:

#### **Ecological literacy**

Ecological Literacy, incorporates all that is essential to living on planet Earth it constitutes the essence of human existence (Center for Eco-literacy, Berkley). To be eco-literate means to be educated in the terminology, the meaning and the application of survival in Earth's varied ecosystems. The term "eco-literacy" was first coined by American educator David W. Orr and physicist Fritjof Capra in the 1990's, bringing about a new element and concept in education, that students are future "earth-keepers". An ecologically literate society would be a sustainable society who would be careful not to be destructive or disrespectful to the natural resources which all life on this planet are dependent (Morris, Briggs & Zidenberg-Cherr, 2000).

#### **Garden Based Education**

Data explored gardens integrated into the educational curriculum. The majority provided essential learning components within a number of schools world-wide, the concept of a school garden was seen as a tool that taught children about plants, nature, and the outdoors (NFER). Further exploration uncovered that gardens have also taught

children about history, economics, poetry, and math. However, school gardening programs generally focused on science.

The overarching aim of most School Gardening Programs is to raise the profile of gardens as a natural, sustainable resource (an outdoor laboratory) that has the capacity to offer curricular, social and emotional benefits to pupils. Outcomes involving students in school gardening programs, reported in a study conducted by the Royal Horticultural Society (RHS) in conjunction with the National Foundation for Education Research (NFER), provided significant research (Lawson, Benefield, Downing & Woolmer, 2007).

### **Teacher Perception**

Teacher is defined as an educator (Webster Dictionary). Perception as defined in the physical, psychological and physiological perspectives, for the purpose of this study, shall be limited to its scope as postulated by Allport (1966) through judging and evaluating others. Eggen and Kauchak (2001) gave cognitive dimensions of perception; they evaluated perception as the process by which people attach meaning to experiences. Their research provided insights to people retrieving sensory memories, allowing processing to continue with perception. Perception is critical because it influences the information that enters working memory. Background knowledge in the form of schemas affects perception and subsequent learning. Research findings have corroborated this claim that background knowledge resulting from experience influence and form the notion of perception (Glover et al., 1990). Baron and Byrne (1991) called it “social perception” which is the process through which we attempt to understand other persons and the systems or programs those persons are functioning in as members.

**Environmental Degradation**

Erosion, eating away of a coastline or land by the action of water, ice, and/or wind, or wearing-away of a surface by corrosion or traffic of the quality of natural environment caused, directly or indirectly, by human activities (Business Dictionary).

**Academic Enhancement**

Academic, pertaining to a college, academy, school, or other educational institution, pertaining to areas of study that are not primarily vocational or applied, as the humanities or pure mathematics. *Enhancement* is defined as to intensify, increase in quality or value. Also the word establishes power or improvement. It is derived from the old French word *enhaucier*, meaning, “to raise” (World English Dictionary).

## **Chapter II: REVIEW OF THE LITERATURE**

### **Scope of Review**

The literature review served three purposes. First, it took a broad exploration of school garden literature and developed a model of Garden Based Education (GBE) in historical and contemporary settings. Second, it investigated the literature related to teacher perceptions on GBE, and finally, it examined the social, environmentally-political, and academic factors facing the new global learner within a GBE context. This chapter includes the literature as it relates to the three-pronged focus areas of GBE: environmental degradation, nutrition, and academic enhancement. Defining the purpose and significance of the researcher's study, the theoretical and conceptual frameworks relate to a review in prior literature, as they are analyzed.

This literature review addresses the historic perspective of GBE, followed by the trifecta of environmental degradation, nutritional sustainability, and academic enhancement with the use of school gardens by professionals in the field. Little research was found in the area of teacher-perspective studies with regard to school gardens. Therefore the literature was limited to a broad search criterion in which the body of literature described the content of school gardens as they related to the three major areas of pollution, nutrition and curriculum development.

Articles on GBE found in journals related to; health, nutritional-behavior, environmental education, horticulture-therapy, plant-based studies, place-based education, and youth development, exemplified the limitation of the literature on the specific areas concerning teacher perceptions and GBE curriculum development. The

studies reviewed were empirical as well as qualitative narratives that employed anecdotal evaluations.

Because the experimental literature on teachers' perceptions of GBE is limited, the mixed method studies included in this literature review explored multiple fields. These studies related to the environment as an integrated contextual tool for teaching. The analysis provided information on situational awareness as it related to school gardening programs (Hayden-Smith, 2006).

When reviewing the research on schools around the world that provide a clear example of "best practices," using GBE, Golley (1998) describes the Cowick First School in England as among one of the best hands-on, ecologically sound schools. Additionally, the research on the Children's Garden School in Mylapore, Chennai, South India, founded in 1937, consistently facilitated successful GBE programs in urban and rural areas and sets exceptional standards (Hohmann & Weikart, 2002).

The need for students to take an active role in protecting the environment they live in and insuring future generations, quality and abundance of natural resources, drove the purpose of the research. United States elementary educators historically intended and anticipated outcomes of classroom curriculum to align with the "affective" domain. Not the "cognitive" domain (Posner, 2007). Therefore, expectations and planning have historically focused on primary skills, not depth of understanding. The principle investigator sought to evaluate a recent paradigm shift. The U.S. education system is in economic competition with other global systems, encouraging teacher pedagogy to reflect student cognitive gain (Perkins, Tishman, Ritchhart, Donis & Andrade, 2000).

## **Garden Based Education**

### **Historical Influence on School Gardening in the United States**

One of the earliest school garden programs in the U.S. developed in 1891, at the George Putnam School in Roxbury, Massachusetts is active today as the nationally recognized Food Project. The project teaches youth about gardening and urban agriculture in the Roxbury neighborhood of Boston. Henry Lincoln Clapp, affiliated with the George Putnam School, traveled to Europe for inspiration (Hayden-Smith, 2006). After traveling to Europe and visiting school gardens, he applied to design the Massachusetts Horticultural Society garden at Putnam. The model, replicated throughout Massachusetts, influenced a well-known garden program in New York City: the DeWitt Clinton Farm School (Story, Neumark-Sztainer & French, 2002).

Many notable educational philosophers, including John Dewey, believed that experience was the starting point of all learning (Dewey, 1938; Ornstein & Hunkins, 1998; Ravitch, 2000), and promoted this type of experiential education. Environmental education provided children with the opportunity to practice responsible environmental actions, which helped them to develop new environmental behaviors (Dressner & Gill, 1994; Hudson, 2001). John Dewey's stance on school gardens stems from his support of the war efforts of his time, the power of his convictions and support of later developments in constructivist education are evident in the following quote:

“What, then, is the duty of the school? In the fight for food, and it will be a fight, school children can help... In addition to the economic profits, there would be for the children health and strength, removal from temptation to vice, and education

of the best type; and for older persons, rest and recreation in the open air and the joy of watching things grow (Dewey, 1917)”.

A study conducted by Hayden-Smith (2006) uncovered evidence that historical assumptions were truly embedded in early U.S. schooling. The U.S. Department of Agriculture estimated that there were more than 75,000 school gardens by 1906. Gardening was a national pastime in the Gilded Age (1877-1897) and Progressive Era (1887-1917). As their popularity soared, advocates busily supplied a body of literature about school gardening and agricultural education (Golley, 1998). School gardens in the U.S. became a natural outgrowth of earlier community garden efforts, as well as civic and philanthropic work, largely conducted by women in urban settings.

Research shows the school garden movement accelerated in World War I, when the Federal Bureau of Education introduced the United States School Garden Army, the conception of “Victory Gardens”. During the interwar years and the Great Depression, youth participated in relief gardening. Renewed interest to the idea of school and youth gardening, and another period of intense growth began in the 1970’s, during an economic down turn and again in early 1990s. Interest in farm-to-school programs gained momentum as California developed legislation to encourage school gardens (Block, Patterson & Subar, 1992).

Under the tenure of California education Superintendent Eastin, the “Garden in Every School” program began, and under Assemblyman O’Connell’s tenure, Bill 1535, funded school gardens (California Healthy Kids Resource Center, 2010). In both World War I and II, the U.S. encouraged youth to express their “love of country” and commitment to the nation’s wartime goals through Victory Garden programs (Hayden-



Smith, 2006). These gardening efforts were typically progressive in tone: they sought to correct or reform a wide range of perceived social, moral and educational agendas and advocated associative means. School gardens were one part of the broader nature-study movement during the Art and Crafts Architectural period at the turn of the century (Lawson, 2007). Historian, Lawson lists the various names included under the umbrella of the initial GBE movement, several are still in use: “school gardens, school home gardens, children’s gardens, school farms, farm schools, garden cities” (Lawson, 1999).

In 1904, Miller wrote, “Children’s Gardens for School and Home”, *A Manual of Cooperative Learning* the preface was to place curriculum at the forefront of the U.S. school garden movement. Daily (1997) points out that Miller’s book described two primary purposes of children’s gardens: civic beautification and nature study, with the goal of inspiring appreciation that would ultimately influence a student’s civic character (Daily, 1997). Miller clearly saw educational purposes for children’s gardens. Dr. William T. Harris, then the Federal Bureau of Education Commissioner, wrote Ms. Miller in appreciation for her involvement in the governments support. This was a pre-farm subsidy act (Paul, 1999).

Miller’s book argued that school gardens were not a “new phase of education,” but rather, an “old one” that was gaining merit for its ability to accomplish a wide variety of needs (Daily, 1997). School gardens were a way to reconnect urbanized American youth with their agrarian, producer heritage, the Jeffersonian farmer model. School gardens could help immigrant children, as well. Miller also argued for the importance of gardening education and nature study for both urban and rural youth, for “sociological and economic” reasons. Another text that was influential in the GBE movement, Maria

Louise Greene's "Among School Gardens", became a historic, standard in school gardening literature. The information; addressed the purposes of school gardens, gave information about the best school gardens and model programs, provided detailed and practical how-to information, and shared information about the quickly growing school garden movement in the United States. Greene's book provides a foundation for developing school's progressive reforms. The author writes that the "underlying purpose of the teaching is threefold, educational, industrial and social-moral." In the research conducted by, Morris, Briggs, and Zidenberg-Cherr (2000), insight to various historical references is based on this triad. New York's DeWitt Clinton Park School founder is quoted in Greene's book, saying:

"I did not start a garden to grow a few vegetables and flowers. The garden was used as a means to...teach them in their work some necessary civic virtues, private care of public property, economy, honesty, application, concentration, self-government, civic pride, justice, the dignity of labor, and the love of nature...." (Morris et al., 2000).

The researchers point out how the Agricultural Experiment Station, created in 1909, at the University of California, Berkeley, began a century long conflict in holistic education. This location was a flagship agricultural campus for California's Land Grant Institution, and housed the innovators of garden education resources for schoolteachers.

An early researcher in the area of constructivism, Zelda Rogers, who was a teacher in Ventura County, California around the turn of the century, claimed that school gardens promoted learning in all areas of education (Morris et al., 2000). Rogers' experiment has allowed school gardens to flourish in certain regional public schools in

California's Ventura Unified School District. The Ventura Unified School district developed a nationally recognized model that links school gardening, nutrition education and a farm-to-school lunch program featuring locally sourced fruits and vegetables for its 17,000 public school students (*California Healthy Kids Resource Center*, 2010).

Ancient Greeks and Romans addressed the need for gardens as places of learning (White, 2005). Plato was influential in the ancient's importance of, "knowledge of the natural world". Theophrastus made a garden, which he bequeathed to his school, "for friends who will meet there and discuss philosophy" (Alexander, 1995). Theophrastus' garden was close to the Lyceum, and Theophrastus annexed this after Aristotle (who once taught there) had left, naming him as his successor. In this place, there was a sanctuary of the Muses, and a hall containing maps for teaching geography, and a statue of Aristotle, a clear display of interdisciplinary education in ancient-times. The city-states found philanthropists, such as Praxiteles, who commissioned to make the statue of Nicomachus, and entrusted the care of the houses, the garden and its walks, and the memorial that he desired to have erected, to his philosophical slave Pomphylus. Encouragement of the teachings provided an education to all who had access to the garden.

The founder of the kindergarten movement, Friedrich Froebel used gardens as an educational tool (Froebel, 1887). Froebel was influenced by Swiss educational reformer Johann Pestalozzi (Marshall, 1988), who saw a need for balance in education, a balance that incorporated "hands, heart, and head," words and ideas that would be incorporated nearly two centuries later into the mission of the United States Department of Agriculture's 4-H youth development program (Silber, 1965). Many schools around the world are designing their grounds to embody the ecological principles they wish to teach

their students. The strongest programs appear to be ones that engage in gardening. The Cowick First School is among one of these hands-on ecological model schools, the school has been in existence for close to thirty years (Danks, 2003). The understanding of ecological principles and nutritional awareness are symbiotically connected through eco-literacy.

The 2002 research conducted by Dennison, Jenkins & Rockwell, in which a dietary fat intake was measured, showed that the classroom provides an optimal setting to reach and have an impact on children's nutritional understanding (Dennison et.al, 2002). Most U.S. children attend school regularly, and many consume at least one meal prepared at the school each day (Kennedy & Goldberg, 1995). In a review of school-based nutrition education programs, researchers concluded that programs modeled after a theoretical framework were more effective at influencing health-related behaviors (Dennison et. al., 2002).

### **Social Cognitive Theory**

For school-age children, programs based on the Social Cognitive Theory (SCT) appeared to be the most effective (Lytle & Achterberg, 1995). The SCT is comprised of three interrelated factors: the individual, the environment, and the behavior (Bandura, 1986). This particular theoretical framework, which the researchers conclude is beneficial when working with a younger audience, recognizes the impact of the environment on a student's ability to learn new behaviors. Several nutrition education programs have made it evident that it is possible to alter children's behaviors (Domel et al., 1993b; Luepker et al., 1996; Perry et al., 1985, 1988; Resnicow et al., 1992). However, despite progress

made in the field of nutrition education, it still is difficult to positively influence children's dietary habits long-term (Morris et. al., 2000).

### **Fruit and Vegetable Intake**

Another study (Krebs-Smith, 1995) found that by studying students in school settings there were definite patterns of behavior that were significant to environmental understanding and connecting that understanding to nutritional values. The researcher used curriculum and assessment tools, which were tested, in classrooms that reflected the demographics of children in the state. During the 1997-98 school year, the ethnic breakdown of schoolchildren in California was as follows: 8.8% African-American (not Hispanic), 8.1% Asian, 40.5% Hispanic or Latino, and 38.8% White (not Hispanic) (CDE, 2000). The schools selected to participate in this project met the following criteria: had students with demographics similar to those of the schoolchildren across the state; resided within a 75-mile radius of the University of California, Davis; and had garden sites readily available for use by teachers (Krebs-Smith, Cook, Subar, Cleveland, Friday & Kahle, 1995).

The data collected in the Dennison nutrition study resulted in research that stated; educating children about nutrition is critical for dietary behavior patterns to improve (Mcpherson, 1999). Many education programs have attempted to incorporate nutrition into a comprehensive school health program. Some have observed changes in knowledge and only a limited number of programs have resulted in behavioral changes. The study suggested that current school-based nutrition education programs are often unsuccessful because they are short in duration. Evidence suggests that approximately 15 hours of instruction are needed to change an individual's knowledge and 50 hours to change his or

her behavior (Connell et al., 1985). However, teachers are often unable to provide that much time for nutrition and health-related topics and must integrate them into other subject areas. In addition, it may also be beneficial to alter the students' environment to continuously reinforce the material even when it's not being discussed in class.

Additional research points out that the level of intensity, at which teachers implement lessons, is also correlated with program effectiveness (Dennison, 1998).

A study by Story, Neumark-Sztainer, and French (2002), provided information regarding GBE field trip opportunities, allowing students an experience in a natural setting without the; typical expense, effort and distance issues that often accompany traditional field trips. The length of time and effectiveness, measured in a study by Emmons (1997) on an outdoor environmental education program in Brazil. The researcher shows teachers' perceptions on student acquisition of knowledge from nature based excursions the significance of prior knowledge was a major consideration. Revital and Tal (2004) evidenced in their research on pre-visit activities, teacher's responses to student motivation. The findings showed greater acquisition of knowledge with prior hands-on experience (Tal, 2004).

Student's ability to think systematically in the ever-changing global society driven by technology, incorporating global travel and inter-relationships, both socially and in business is essential. Thinking systemically requires several shifts in perception, which lead in turn to different ways to teach, and to different ways to organize institutions and society. These shifts are not alternatives they are interconnections to real-world learning and application (Story et.al., 2002).

The learning, enhanced through garden based education, approaches attainment of knowledge, through the perspective of “part to whole”. The ability to comprehend part to whole, establishes concepts of global society, our planet’s climate, our nationally ability to compete educationally and in business, and our local sustainability. Gardens are teaching tools for motivation of different styles of learning, continuity of skill acquisition, and personal discovery propagating respect for the tenacity and fragility of Earth’s ecosystems. Each of the articles provides an aspect linked to the critical element of eco-literacy in education today.

### **Student Comprehension of Environmental Factors**

In a study conducted in 1998 by Peter Kahn, related to teacher perception through a comparison of subjective scores reflecting understanding of assessment of student’s environmental knowledge. The corresponding objective test scores revealed a poor correlation (Kahn, 1999). Kahn’s study acknowledges a learner’s prior experiences, promotes challenging situations and impromptu tangents and supports learning that incorporates student lead activities. The research shows that GBE initiates cognitive inquiry through hands on learning (Khan, 1999). Several authors supported integrated curriculum design elaborating on the interdependence of learning formats, settings and materials.

One significant purpose for the pre-existing research in environmental-sustainability is the interest in Earth’s climate change and loss of landmass due to over population. It is imperative that educational options explore solutions to over use of natural resources. John Muir wrote, "When we try to pick out anything by itself, we find it hitched to everything else in the universe” (Browning, 1988). The integrated

curriculum options with a school garden, reviewed in the literature, explore learning as a process, not as product driven. It is notable that a researcher and scientists have written articles on the experimental concepts in scientific thinking, which reflect public awareness of environmental issues such as the Gaia hypothesis (the Earth as a living organism.) and Chaos theory (the science of surprises, of the nonlinear and the unpredictable. It teaches us to expect the unexpected (Lovelock, 1987).

The physicist-author Fritjof Capra (1997) argued “the more we study the major problems of our time, the more we come to realize that they cannot be understood in isolation.” Our environmental situations contain systemic problems, proving that they are interconnected and interdependent. In the study conducted by Dillon and Morris (2005) the international review on the impact of outdoor learning was examined using qualitative methods.

## **Baytree Design**

### **History of the Sponsor/ Research Relevance**

Primarily, the research has explored issues surrounding three significant focus areas of elementary environmental education, as they aligned to areas of national concern; pollution, nutrition and enhanced curriculum development for global competition in education excellence. The collection of data from a case study perspective, narratives and survey questions, and facilitated enhanced understanding of the current state of GBE as it analyzed and developed nutrition based benchmarks. An in depth examination to environmental education’s achievements, nutritional comprehension, and environmental protection was reviewed through the perceptions of teachers engaged in



the school garden activities. Allowance for any gaps that are extant in the field, were documented.

The conceptual framework of the proposed study consisted of preceding concepts, implemented by a Florida based program director, Erica Whitfield, of the Robert Wood Johnson Foundation's Healthy Kids Healthy Communities (HKHC) Program. That program's purpose was to "build on the success of the Southeast Florida's public school district's wellness promotion efforts", and to implement a shift policy, and address environmental issues within the context of the school day.

The HKHC program supports the potential of school gardens. The program believes in the impact these gardens have on a reduction in obesity, encouragement of a healthy lifestyle-connection to youth with nutrition for sustaining a healthy lifestyle and vibrant community. However, the need to provide informative feedback and pertinent perspectives from classroom teachers who utilized the current GBE program supports the research. Baytree Design has current data and the study has promise to be replicated.

HKHC has relied on a strong public and private sector commitment to create a community of wellness that complements the school-based initiatives. The program currently has a lack of valuable data, as a perception study has not been done before. The principle researcher's teacher perception study was conducted with a sample population from a limited number of participating schools, showing data that measured the impact of such programs.

The researcher found the work Baytree Design has completed; encouraged children and families to participate in establishing community gardens, farmer's markets, and other retail initiatives that increased access to fresh fruits and vegetables for

vulnerable children and their families. Issues of obesity, malnourishment and fiscal responsibility are key components to global awareness, ecological understandings and long-term knowledge, through all core subjects (California Healthy Kids Resource Center, 2010). These were goals of the HKHC program as well, which provided the principle investigator reason to explore teacher perceptions on school gardening curriculum programs, more extensively in Palm Beach County, in the future.

The concept lay in schooling that is "smart by nature." It includes experiencing the natural world; learning how nature sustains life; nurturing healthy communities; recognizing the implications of the ways we feed and provision ourselves; and knowing the places where we live, work, and learn. Teachers were in a prime position to be able to incorporate these basics throughout the curriculum at every grade level.

## **GBE Political Implications**

### **United States**

In 1970, the inception of an annual Earth Day and interest for environmental awareness was recognized. The issue surrounding environmental degradation has been controversial and used as a political tool. In 1962, Rachel Carson's *Silent Spring* stirred some people to take notice of the degradation to the natural resources that are essential for sustaining human life (Carson, 1962; Krause, 1993). In the early 1970s, air, water, and land pollution became more than just unsightly; people became more concerned with human health threats and threats to other necessary resources (Howell & Warmbrod, 1974; Krause, 1993).

**Internal or External Connections to Sustainability.** An internal locus of control is an individual's belief that he/she caused the outcome of a certain event, whereas an external locus of control is the belief that others caused the outcome of an event. A high environmental locus of control would lead to a person believing in his/her ability to make a difference and acting responsibly regarding those environmental issues, as well as that person becoming more inclined to be environmentally proactive (Hines et al., 1987; Newhouse, 1991; Ramsey, 1993).

Politically the world at large is in conflict between those concerned with environmental outcomes and those who are not. The politics that control, farming subsidies, forestry and conservation are important aspects for future generations to access and understand. Environmental knowledge, environmental attitudes, environmental locus of control, and a sense of responsibility were elements deemed critical to producing responsible environmental citizens (Hines et al., 1987; Newhouse, 1991; Ramsey, 1993).

Advances in technology were one of the first methods used in combating some environmental crises (Newhouse, 1991). People quickly realized, however, that to prevent further damage to the natural ecosystem, it would be necessary to produce environmental stewards capable of making knowledgeable and conscientious decisions regarding the environment (Culen et al., 1986; Gigliotti, 1992; Hungerford and Volk, 1990).

Universities began to introduce programs of study in fields such as Environmental Engineering in the 1970's. Environmental knowledge and attitudes lead an individual to obtaining knowledgeable environmental facts and issues. The realization that human influences have a greater impact on the environment than technological advances,

facilities of higher learning and government demands produced a growing field of environmental programs in government sectors, nonprofit organizations, and public schools, to improve the environmental actions of citizens (Howell & Warmbrod, 1974; Knapp, 1972; Ravitch, 2000). The emergence of “environmental education” has become part of the classroom curriculum for many institutions.

Impediments to implementing environmental education into a classroom curriculum such as a lack of resources, funding, and time are effects of administrators and influential stakeholders who have low or no locus of control and/or concern of environmental degradation (Disenger, 1998; Ham and Sewing, 1987; Ramsey, 1997). Informational misunderstanding and ignorance has contributed to teachers being unable to integrate environmental education into the classroom curriculum. Little or no exposure to eco-literacy, environmental studies and social implications of global environmental conditions, has lead teachers to associate environmental education only within the context of the science curriculum (Ham & Sewing, 1987).

The pedagogy of essential instruction of environmental education across all subject areas is pertinent to the contemporary rigor and relevance in education. The key term, eco-literacy found in the educational vocabulary of the 21<sup>st</sup> century provides a guideline for curriculum development (Lieberman & Hoody, 1998). The political implications of such pedagogy are reflected in funding, communication-support and professional development. Researchers suggested, environmental education was most effective when integrated into all classroom subjects, and not simply focused in just one subject area or at one grade level (Ham et al., 1987; Lieberman & Hoody, 1998; Ramsey et al., 1992; Skelly & Zajicek, 1998; Wilson & Smith, 1996).

In addition to the barriers environmental educators have, the children they are trying to reach live in an industrialized environment that often offers little chance for direct contact with natural ecosystems (Hudson, 2001). Children in this society often have to depend on secondary sources such as television shows and educators to learn about ecology and their natural surroundings (Cohen & Horm-Wingerd, 1993; Knapp, 1972). Many children lack a personal intimacy with the environment that would enable them to have a true understanding of common environmental problems (Hart, 1977; Hudson, 2001).

The interaction of children with nature in a garden may be one solution. The use of a garden in the classroom setting provides the right experience for children needing to learn about their natural environment (Pale et al., 2001; Waliczek and Zajicek, 1999). With garden based education, children can actually experience ecological processes first-hand. In addition, a gardening-based curriculum can cover a wide range of classroom subjects while giving the students a glance at nature on a more personal level (Eames-Sheavly, 1994; Klemmer et al., 2005; Pigg et al., 2006; Skelly and Zajicek, 1998).

Increasingly school gardens are being used as vehicles to teach the food cycle, nutrition, and culinary science along with efficacy of culture. In California's Edible School Yard at Martin Luther King Jr. Middle School, and Australia's Kitchen Garden at Collingwood College, there is a serious investment in using the garden to change the attitudes and eating practices (thus nutrition) of students. At the same time, these schools are attempting to develop a new or renewed cultural respect for food, the land that provides it, and the way we enjoy it as a family or community (Alexander, North & Hendren, 1995).

This new emphasis or identification of food, and its origins as a cultural imperative to be understood and appreciated by children, is not only a developed world phenomena, but is also found in less affluent economies such as Cuba (Langer, E., & Piper, A. (1987). In many California schools there is a growing movement to connect the school garden with the school food service), and with local farms that produce the food (Morris, Briggs & Zidenberg-Cherr, 2000). The United States Department of Agriculture (USDA) and the California Department of Education are actually providing small grants to initiate projects (such as Crunch Lunch), and members of the California state legislature are exploring legislation to institutionalize such garden grants.

**Global.** Climate change is the greatest public policy issue of our time (Tillbury, 2002). Education for sustainable development in a global society is essential (United Nations, 2007). UNESCO's recommendations that research should be used to support the development of education for sustainability beginning in 2000 and completed by 2020, has not begun development as was expected. There is need to strengthen research, to document the state of practice and to explore learning outcomes as well as possibilities and problems of general relevance (Fritjof, 1993).

One country that has taken a lead in the area of citizen "Green", understanding is Canada. Canada's Green Plan reinforces a national program to include environmental studies as a core subject, essential for graduation. Conservation strategies implemented in the provinces support the education ministry in instituting sustainable development-related activities into schools. The Canadian Teacher Thinking and Practice in Environmental Education Project was a phenomenological study replicated (in part) from a British study conducted by researcher Joy Palmer, who looked at children's responses

on environmental concepts. The study also took elements from an Australian study conducted by researcher Ian Robottom, whose case studies explored student attainment of environmental knowledge, as seen in the outcomes of a teacher perception study (Robottom & Hart, 1993).

Mary Chambliss, the acting administrator of the United States Foreign Agricultural Service, indicates that, “the urban population in developing countries is expected to double to nearly 4 billion by 2020.” Roger Hart notes in his book, *Children’s Participation*, that when families of developing economies leave the land for urban life, there is a tremendous interruption in the child’s informal learning about the environment. In order for these citizens to make appropriate decisions that will contribute to sustainable development, they will have to have access to education and experience with environmental issues.

The researcher found Hart and Robottom’s (1993) suggestion, “everyday enjoyment of natural environments close to home – wild common-lands, gardens, ponds, city farms, or schoolyards are essential elements to learning”, pertinent to comments made by her case-study sample population. Hart suggests that, “as they [children] develop they should also have gradually expanding opportunities to be directly involved in developing these places and caring for them” (Robottom & Hart, 1993). This speaks directly of developing a child’s active democratic participation in the governance of their communities. In the case studies the principle researcher analyzed, Brazil, Costa Rica, Cuba and Mexico, all had interest and practice in issues around environmental education and sustainable development that were evident, and the opportunity to involve children in

the planning, design, construction, as well as the management and monitoring of activities (Robotton & Hart, 1993).

### **Educational Environmental Theory**

Philosophers and educational reformers such as John Amos Comenius and Jean-Jacques Rousseau discussed the importance of nature in the education of children. By the late 19<sup>th</sup> Century, educators such as Maria Montessori and John Dewey built upon educational theories created by these earlier philosophers and reformers. Both Montessori (NAMTA, 2003) and Dewey (1917), spoke specifically about gardening and agricultural education for youth. They both saw the acquisition of practical (i.e., vocational) skills as only part of the value of gardening experiences (Dewey, 1917).

When sustainability efforts involve the whole school community, the changes in structures and relationships are accepted and are more likely sustained (Barlow, 2012). Student achievement depends as much on the vitality and health of the whole school environment as on the textbooks, curricula, and teachers. The purpose of an education to provide skills for independence are mirrored in constructivist approaches to education.

Miller's (1909) emphasis on gardening with urban youth, was to teach "children to become producers as well as consumers," and for the possibility "of turning the tide of population toward the country, thus relieving the crowded conditions of the city" (Daily, 1997). Other reformers echoed this idea, including Riis (1889), who said, "The children as well as the grown people were 'inspired to greater industry and self-dependence.'" Thus, the theory behind GBE is embracing the nature and etiology of perspective transformation. The principle researcher's theory was based in a constructivist approach



of reification and reflectivity. This allowed a lens into self-directed learning (Lyman, 1981; Perkins, 2010).

**Curricular Advantages.** The naturalist E.O. Wilson (1998) argued that every student (and political leader) should be able to answer the question “what is the relation between science and the humanities, and how is it important for human welfare (Wilson, 1998)”. He argues that that many problems cannot be solved without integrating knowledge from the natural sciences with that of the social sciences and humanities” (Wilson, 1998). Wilson is seen as one of the leading philosophers in his field.

**Holistic Learning.** Students bring their previous experiences into public classrooms, and with present numerous and efficient methods of information gathering and sharing, experiences that were once isolated from a child’s local environment become easily accessible by using the appropriate means for collecting information. With the use of today’s ever-advancing technology, students now have greater opportunity to engage in new, enriching experiences (Briggs-Cummings, 2001). Holistic education theorists and progressive schools argue that multiple intelligences exist and that cognitive development is but one form of intelligence. Linguistic, logical/mathematical, intrapersonal, interpersonal, musical, and kinesthetic and visual/spatial are the seven intelligences as presented by Gardner (1983).

When schools, classrooms, or teachers produce unsuccessful results defined by low-test scores or high dropout rates, reform becomes a traditional remedy. However, reform with substantial equity addressing socio-economic factors, is “rare”, and often remedied through short term programs that provide little longitudinal data (Nieto & Bode 2008). A concern for equity is a common reason cited for “high stakes” testing, linking

test scores to the success of schools, teachers, and students. However, a 2005 study conducted by Dillon, provided insight on how students were able to exemplify their physical strengths. Dillon went on to discuss how activating an understanding of citizenship, engaging their academic prowess, while involving decision-making strategies utilizing Garden Based Curriculum, brought about change (Dillon, J. et. al.). With reference to GBE, Students regardless of their abilities in other areas were able to participate (making contributions) and developing admirable skills within the garden project (Dillon, Morris, 2005).

### **Nutritional Awareness**

The qualitative studies based on school garden use, shows that children's eating habits are disconnected with their environment as well as the national recommendations for nutritional value (Dennison et al., 1998; Krebs-Smith et al., 1996; Mcpherson et al., 1999). The seminal research on the topic of GBE or Garden Based Learning point out the benefits and show the gaps that such educational reforms have had.

The seminal study by Dennison emphasized the important concepts that often are lacking in nutrition-education programs, that being the relationship between nutrition and agriculture. Moreover, the study stated, while agriculture-based lesson plans are available in abundance, they have not focused on nutrition information and dietary behaviors. At the time of this study, no well-tested curriculum existed that adequately linked nutrition lessons in the classroom to vegetables growing on school grounds (Morris et al., 2000).

## **Academic Enhancement**

This section covers general points about teaching each core academic subject through GBE, garden based education. Teachers at schools that incorporate gardens into their curriculum are making thinking visible, allowing teachers to more accurately assess students' understanding. Classroom activities become more learning oriented rather than work oriented (Marshall, 1988). Students who previously believed they lacked a voice or that their ideas were not valued, including students with learning disabilities, participate more actively and confidently (Ritchhart, Palmer, Church, & Tishman, 2006); and students' awareness of thinking strategies dramatically increases at all grade levels (Ritchhart, Hadar, & Turner, 2008).

GBE as a means of teaching science and addressing the standards, can provide teachers and their students an outdoor laboratory in which to observe the structure and function of plants and animals, explore relationships within and between ecosystems, and witness the cycles of natural systems (Tal, 2004).

Gardening is a continual exercise in investigation and experimentation, whether in formal experiments or in the informal practice of gardening in which gardeners test ideas and make adjustments. Gardens allow for the study of renewable and nonrenewable resources in food production. Resources and their conservation is a recurring strand that runs through both science and history standards, integrating all subject areas. Most important, the garden experience transforms students from observers to participants in one of life's important cycles as they plant, harvest, prepare, cook, eat, and compost food (Morris, Briggs & Zidenberg-Cherr, 2000).

Taking a systems perspective, student's revisit the life science concepts they learn in a spiraling format throughout each grade. Teachers witness students studying how energy flows and matter cycles through natural systems. In a garden a setting, students have an opportunity to explore ecological principles and understand the natural resources involved in food production. Teachers are available to help students formulate hypotheses, while guiding student lead learning (Reichart, 2010).

**Cultural Connections and Cohesion.** Culture is often the driving force behind student's motivation to learn. For educators interested in schooling for sustainability, a garden is starting place. Many cultural barriers are broken when global awareness of the commonality of agrarian societies is present (Davies et.al, 2001). Even a small plot or container garden can help children learn basic ecological principles first-hand. In cities, a school garden can provide a young person his first connection to the natural world.

Although students presently live in a vastly changing age of information, classrooms remain a reflection of the defined social classes found in every American city and neighborhood (Berliner, 2006). Despite the legislative efforts to desegregate education racially and financially, inequities remain an obstacle for administrators, teachers, and students. Resource allocation has not resolved the achievement gaps that exist between race, gender, and class. As Berliner suggests, "Although the power of schools and educators to influence individual students is never to be underestimated, the out-of-school factors associated with poverty play both a powerful and limiting role in what can actually be achieved" (Berliner, 2008).

Food remains one of the easiest and most pleasurable ways to experience unfamiliar ways of life and to understand the commonalities of people. The connections

between cultures through foods, breaks down barriers and raises questions. The approach to basic education offered by the World Conference on Education for All (2000) presents another insight into the world of teaching and learning. The abolition of discrimination through community gardens has proven successful in urban-communities; schools are often the core of a community culturally and can be models of nutritionally sound ways of living.

Bringing families together may curtail the obstacles faced by administrators in title I schools. Gardens offer families a way to participate in school life. Some families, particularly those from other countries, may feel uncomfortable when asked to volunteer at school because their English skills or educational background does not give them a solid classroom footing. For these families the living classroom of a garden can be a much more inviting environment in which to engage in their children's education.

**Science curriculum.** GBE potentially supports the science standards, particularly in life sciences. Students learn that plants are the primary source of matter and energy entering most food chains, that producers and consumers are related through food chains and food webs and may compete with each other for resources in an ecosystem, and that many insects and microorganisms are beneficial. In a school garden students learn how to characterize ecosystems, and they study the interdependence of living organisms in an ecosystem (Hohmann & Weikart, 2002).

In a 2005 article titled, *Use of School Gardens in Academic Instruction*, Graham, Beall, Lussier, and McLaughlin investigated 4,194 California school principal's perceptions on the status of gardens in California schools. The survey was in relation to enhanced curricular development and student enhanced learning. The design survey was

a self-administered Internet survey, which was sent to all California principals (N = 9805). The variables that were measured provided data on school garden practices, attitudes associated with the use of gardens in schools, and perceptions of barriers to having and using school gardens in academic instruction.

In this study there was a 43% response rate. The most frequent reason for having a garden was for enhancement of academic instruction. Gardens were most commonly used for teaching science, environmental studies, and nutrition. Principals strongly agreed that resources such as curriculum materials linked to academic instruction and lessons on teaching nutrition in the garden would assist in the school garden being used for academic instruction. Principals deemed the garden as being not to slightly effective at enhancing the school meal program. The follow up implications stated that school gardens appeared to be predominantly used by most schools to enhance academic instruction. The researchers define a need for curriculum materials and teacher training for gardening and nutrition. The link between the garden and the school meal program was an area that clearly required attention. School lunch was seen as a logical setting for provision of edible produce, its importance in a nutritionally well-balanced diet, and as a tool for science comprehension, both biology as well as ecology (Graham, et al., 2005).

**Social Studies.** In the Learning Survey developed by David Perkins (1998), the responses to social studies curriculums that were enhanced by school gardens showed an appearance where authentic learning of societal effects on natural surroundings rated 95% in contextual understanding, (relating what was learned to economic, legal and cultural systems). The study provided data that measured acquisition of knowledge specific to socio-cultural effects of farming and land use, which had findings also in the 95% range

with regard to student enthusiasm (Perkins, 1998). The surveys themselves had a 96% return rate from the teachers who took them (Perkins, et al., 2000). The researchers explored teacher perception on food, agriculture, and the cultures that developed alongside food production as they pertain to student learning in the social-science curriculum (generally referred to as social studies) to provide relevance of topics that integrate biology and botany and the interdependence of all living things.

Through gardening, students explored connections to the past and identified the differences between the past and the present. Agriculture is a significant part of American history, the economy, and the landscape. Students understand the gardening experience when engaged in first hand activities. Global awareness to the study of current farming practices and the development of agriculture in different parts of the world, adds a dimension to the study of history–social science (Abramovitz, 1991).

In the qualitative study done by Korten (Project Director for The Partnership for Agriculture and Science in Education at the Los Angeles Unified School District, 2010) exploration of school garden funding in the United States is analyzed. The data shows the emphasis on the changing population from 1850 to contemporary GBE. Her findings on Garden Based Education show integrated learning within a multitude of information. How people obtained food and how agriculture changed over time. Students also studied trade routes, migration patterns, folklore, and political and economic forces that shaped the United States (Korten, 2007).

**Mathematics.** Mathematics has many practical applications in a school garden. Designing, building, and measuring garden infrastructure, such as raised, garden beds or boxes for potted plants, are activities that can meet measurement and geometry standards.

Standards on measurement, fractions, percentages, and proportions come alive through cooking. Many statistics, data analysis, and probability standards reinforced through manipulation of data collected from garden experiments or surveys on plant preferences and nutritional factors provide essential skills for students in every grade.

The study by Cochran-Smith, *Investigating Mathematical Relationships*, looked at the connections between various environmental concepts and plant growth, provided teachers a means of addressing some of the algebra and function standards required by state mandates. The researchers analyzed garden-based problems in statistics, measurement and geometry, and algebra and functions, they also collected data on teacher's perceptions on student's mathematical reasoning. (Cochran-Smith & Lytle, 1993).

**English–Language Arts.** When teachers integrate English–language arts instruction into agricultural history, science, or even mathematics in the garden, students have the opportunity to apply English–language arts concepts and skills. By reading garden-related literature or conducting research in science and history, students improve their reading skills. Writing research reports or descriptions filled with details helps students meet the standards for writing. Students' oral presentation of ideas, questions, research findings, and experiences develops the students' listening and speaking skills. The potential exists for GBE to support almost all of the English– language arts standards. In the study conducted by Lytle (1993) the students who utilized the reading garden in one school showed significant improvement in fluency.



### **Beyond the Core Academic Subjects**

Many other areas of study beyond the core academic subjects can be enhanced by GBE; for example, in home economics students study consumer education, foods and nutrition, and health. Service-learning, agricultural literacy, environmental education, art, and music also lend themselves to GBE.

In service-learning, students fulfill community service requirements through garden-related projects, such as improving school lunches, beautifying the campus, feeding homeless people with produce from the garden, or providing nutrition education. A study conducted by Cammack, Waliczek and Zajicek (2002) in agricultural literacy programs, pointed out that gardens provide teachers with an accessible, practical setting for their programs. In environmental education, gardens provide small-scale ecosystems that offer numerous opportunities for students to understand natural ecosystems. Gardens can provide inspiration for art and music projects and, in turn, art and music programs can enhance and expand on what children learn in the garden. For example, through drawing plants or learning songs with garden themes, children gain a new perspective on their garden experiences (Cammack et al., 2002).

### **Teacher's Perceptions on Learning**

Miller (1904) argued that school gardens were not a “new phase of education,” but rather, an “old one” that was gaining merit for its ability to accomplish a wide variety of needs. School gardens were a way to reconnect urbanized American youth with their agrarian, producer heritage, the Jeffersonian idea of the sturdy yeoman farmer. School gardens could help “Americanize” immigrant children, as well. Miller also argued for the importance of gardening education and nature study for both urban and rural youth,

for “sociological and economic” reasons. Miller stated that one important reason to garden with urban youth was to teach “children to become producers as well as consumers,” and for the possibility “of turning the tide of population toward the country, thus relieving the crowded conditions of the city.” Other reformers echoed this idea, including Jacob Riis, who said, “The children as well as the grown people were ‘inspired to greater industry and self-dependence.’ They faced about and looked away from the slum toward the country.”

Underpinning the perceptions of teacher’s beliefs and comprehension of their student’s acquisition of knowledge is the proposition that educational-professionals construct theoretical views, which guide their pedagogy (Cochoran-Smith & Lytle, 1993). These approaches, constructed through self-experience and often not explored or enhanced throughout the practitioner’s career are gaps in quality education programs. An interest of this study is to develop understanding of the “inside-out” research conducted to help teachers develop personally and professionally through an exploration of their thoughts and actions (Cochoran-Smith & Lytle, 1993).

## **Conclusion**

Based on the articles by Dennison and Graham, clear views into the far-reaching and recent past of Garden Based Education provide the critical elements of health awareness and academic prowess. However, as the United States approaches a new era of technological advancements, education is facing issues regarding the loss of student nature awareness, understanding how the natural world plays a role in human life.

Education is going through a significant paradigm shift in the second decade of the twenty first century. It is imperative that the United States education system is

prepared with research-driven data to support school garden programs due to several contributing factors (Marshall, 1988)

When sustainability efforts involve a whole school community, the changes in structures and relationships are accepted and are more likely sustained (Barlow, 2012). Student achievement depends as much on the vitality and health of the whole school environment as on the textbooks, curricula, and teachers (Miller, 1904). Culture is the driving force behind many students' motivation to learn (Newhouse, 1991). For educators interested in schooling for sustainability, a garden is possibly a learning tool. Even a small plot or container garden can help children learn basic ecological principles first-hand. With urban sprawl, a garden may be a young person's best connection to the natural world.

### **Chapter III: Methodology**

#### **Analysis and Review of GBE**

This chapter provides clarification of the methodology used to conduct the research. The chapter begins with; a review of the research questions, followed by a descriptive analyses of case study methodology, the context of the study, and the research design, including the variables, the sample population, sampling plan and procedure, role of the researcher, instrumentation and data collection procedures. This chapter will conclude with the ethical considerations within the study.

#### **Research Questions**

Based on the previous assumptions, the following research questions were developed:

Acknowledging the aforementioned research problem, these questions were designed as specific points of entry to this study:

1. Do teachers perceive students participating in school garden programs as having a better understanding of the changing conditions and degradation within global environments?
2. Do teachers perceive students, participating in gardening, as comprehending the importance of nutrition and sustainability?
3. Do teachers perceive students show greater motivation in multiple disciplines, through school gardening?

### **Descriptive Analysis**

In a case study, nearly every aspect of the target population's employment history is analyzed to seek patterns and causes for behavior (Yin, 1994). Learning gained from studying one case can be generalized to others. Case studies tend to be highly subjective and it is difficult to generalize results to a larger population. The study is two pronged, being both intrinsic and collective, the researcher has a personal interest in the case and the case involves studying a group of individuals (Goodman & Kruger, 1988).

The method of this study is a qualitative, chronological design, relying on a multistage research format. The triangulated data collection involves, initial surveys, short-term ethnographic interviews and dialogues, and culminating observations. This case study was retrospective in nature. Using self-reflective enquiry with teaching staff in social settings, the grounded theory provided a holistic method of dissecting the findings. Incorporating linguistic, extra-linguistic and contextual structures insured comprehensive data collection for cross coding. Introspection of the sample population revealed the narrative validity and bias.

This data collection method is seen as descriptive, action research. The researcher set up the study to look at conversational analysis through grounded theory coding. The data, once cross-referenced, will be combed for patterns of interaction and possible evidence of correlation within the significance of the research questions. Using a multi modal approach the researcher will solidify each separate finding in an in depth manner.

The researcher utilized an emic perspective followed by an etic perspective to greater insure the ethnographic solidity of the study (Nieto, 2008). The researcher had established consent-to-conduct research from IRB. The researcher chose this design for this proposal, due to her own ontological and philosophical position, that reality is largely subjective. However, the transcripts were analyzed with no interference, to avoid bias.

There are six different sources and methods researchers use in case study methodology to gather information about an individual or group (Yin, 1994; Stake, 1995). Of the six this study incorporates the following: Interviews (involving structured survey-type questions and more open-ended dialogues) documents (Letters, newspaper articles and administrative records) and physical artifacts, tools, objects, instruments and other artifacts observed during a direct observation of the participant sample population. This leads to participant observation, where the researcher served as a participant in events and observed the actions and outcomes.

## **Context**

Three schools were involved in the study. The schools each employed 3 fourth grade teachers within each facility. The participating faculty comprise, approximately 7% of the core curriculum faculty at their respective schools. The teachers were required to cover mandated curriculum in the areas of language arts, math, social studies and science. However, students also frequented a science-lab, on average, two days a week with a specialist, for 45 minutes. The researcher interviewed participants about their beliefs and convictions in science and health lessons utilizing a school garden. The participants as well as peers participated in various activities; including planting, tending, harvesting

garden-grown produce, and participating in community events, for an average of thirty minutes a week over a three month period.

### **Evaluation of Research Methods**

**Variables/Case-Oriented.** The qualitative variables (categorical variables) were measured on a nominal scale and coded for clarity. The grounded theory methodology provided used a “case” rather than a variable perspective, thus providing a comparative orientation (Goodwin, 1996). The population (classroom teachers) were heavily involved in the research study at the first level of the research. They were collaborators and participant observers with others at the second and third levels. The teachers were deeply and personally involved in the classrooms and with their students, so bias may have been a factor and/or delimitation.

The teachers serving as participant-observers markedly reduced the problem of reactivity with the members of the class and school being observed. The participant observers had conducted their own interviews, made observations, and collected data with a minimum of change in classroom behavior. Teachers as participant observers (themselves) were helpful and able to facilitate collecting field data on-site in the classroom.

Teacher automaticity can be unrealized, and intellectually teacher motivation can form an inaccurate interpretation of observed events or, perhaps worse, not recognize that an event or a response is taking place (Gardner, 2010). Teacher participant observers were not naive about the culture of the observation setting, and one particular teacher’s familiarity with classroom dynamics caused a bias factor that interfered with objective data collection. Therefore, the teacher was dropped from further investigation.

### **Independent Variables/Concepts and Properties**

The theoretical definition for this study lies in Grounded Theory predicted through collected grounded information. The operational definition states that the perceptions of teachers, collected through a lens of grounded theory, coded and cross-referenced, provides informed data. The sample population was partially homogeneous, all residing in Palm Beach County. The effects of the study are to be given to Sharon Danks and Lisa Howard of Baytree Designs, for future comparative research.

The study used limited replication of a former study, where responsibility scores and attitudes toward science and the environment of 427 third-grade students were examined, measuring student responsibility; *The Growing Phenomenon of School Gardens: Measuring Their Variation and Their Affect on Students' Sense of Responsibility and Attitudes toward Science and the Environment*. To measure these variables, a student survey was adapted from several indices. Four statements from the Search Institute's Profiles of Student Life: Attitudes and Behaviors measure (Scales & Leffert, 1999) used to assess responsibility.

### **Dependent Variables/Categorical interrelationships**

Ten statements from the University of Iowa's Attitudes, Preferences, and Understandings (1988) index were used to measure teachers' attitudes toward science. Two environmental attitude indices, from the Children's Environmental Response Inventory (Bunting & Cousins, 1985) were reviewed in chapter two. The independent



variable for this study was GBE perception. To measure and classify such perception, data was collected in several ways; observations, interviews including a Delphi Technique, and a teacher survey developed using results from the observations and interviews. Utilizing Grounded Theory, the principal researcher addressed each category first through a matrix, then through the methodology of “open coding”.

### **Sampling Plan**

An initial teacher perception survey was sent to pre-selected teachers actively involved in GBE. Baytree Design founders showed an interest in collecting the perceptions of teachers that have used funding to build gardens on school grounds, for environmental sensitivity, nutrition and cross-curricular enhancement, focusing greatly on science and math. Three schools were addressed and 12 teachers selected, the number of interviewees resulted in 5 participants.

**Target Population.** The sample population participants consisted of 12 teachers, 9 female and 3 male. They were all teachers of a 3<sup>rd</sup> to 4<sup>th</sup> grade curriculum in their respective schools. All selected participants were chosen for their interest or active involvement in Garden Based Education. Their religious beliefs were 4 Christian, 1 Hindu, 2 Jewish, 3 Agnostic, 2 Atheistic. The purpose of religion addressed the sensitivity of ecological degradation and long-term philosophies related to the environment, further explained in chapter, #5 under practical application.

The target sample population, invited by the researcher was voluntary. They were contacted prior to the survey informing them of the study. The researcher then emailed a survey. Participants who responded to a follow-up email scheduled a one-hour interview. At the initiation of the interview the participants were assured of their rights. They were

informed that they would be able to exit the study at anytime and that they would remain anonymous. There was a review of the purpose of the study and the Observation Protocol (Appendix A).

### **Procedures**

The study was dependent on triangulated data. An amalgamation of collection methodology was incorporated; the initial twelve surveys, five follow-up interviews and concluding observations.

The collection of survey questions were modified from the United States E.P.A. sponsored *Project Green Reach* Teacher Evaluation, for Spring 2012. The survey was pilot tested by additional peers at the participating sample population's school sites, for both clarity and cohesion. Upon review, 90% provided no recommendations. The researcher took the other 10% under advisement. A control school did not participate in gardening activities. As part of a pre-post panel study, approximately 12, 4<sup>th</sup> grade teachers were initial participants and completed the Garden Frequency Questionnaire. 5 personal interviews have been conducted with teachers providing cross-coded data, through a synthesis of research findings together with a review of the literature. The researcher cannot anticipate dropouts of participants from the study.

### **Design and Analysis**

**Validity.** The researcher attempted non-judgment orientation in this study. The research study uses action and observational research, which describes and classifies various cultural, racial and sociological groups into a particular category. In this way the researcher is utilizing interpretive and naturalistic approaches. The research relies little on

the experimental design associated with scientific research (reliability, validity and generalize-ability). Therefore this study is a grounded theory investigation of 5 teachers and their process through the Garden Based Educational system. A quadrilateral approach to trustworthiness was reviewed; equivalency, stability, consistency and use of an iterator.

**Threats to the validity.** Some of the ill effects of this research were the ability to obtain the sample population at the start of the study, due in part to ethical complications in contacting the members of a focus group through district employment records. Furthermore, the disaggregated data that was compiled had to fit into a time-conducive calendar that cross-referenced each of the participant's information. Because of the small sample population, the dates became more critical with each member. It was necessary to create a conceptual framework that addressed the assortment of cross references, as well as a data collection matrix. The study had to compile large amounts of detail into a thick description. Qualitative data in this collaborative, triangulated design is supported by, McClintock, Brannon, and Maynard (1985) who refer to the design as a "case cluster method."

**Internal.** The threats to the internal validity were, in its inception, the sample population. The collection period, as well as possibility of the study threatened to become a longitudinal study with little to no closure date set. Due to the grounded theory format of this study, "positivism", analyzing human desires, emotions and assumptions of personal success, were reflected in the case study narratives. The Story-map design allowed plotting and coding to be established. An exploratory design was developed to

demonstrate a technique where the participants had freedom to answer a set of questions that were constructed by the researcher as open-ended questions.

Narrative design is a continuum, a set of basic categories that can be followed as in a flow chart or story map. The organizational method was both selective and precise and (although completed) had the possibility to be ongoing. Threats lay in the integrity of the researcher, his/her ability to provide proofs in the research.

**External.** All identities of the participants remained protected and those in the sample study were treated with respect. The ethical responsibility was followed and timed observations were limited. In order to assure external validity the researcher provided in-depth field notes and kept a minimal field diary. Descriptive field notes assured detailed setting description, while reflective field notes presented the researcher's speculations (as the instrument) and analysis.

All documents are available for member checking to stay within an externally validated research study.

### **Instrumentation**

A teacher perception survey was first sent electronically, then follow up interviews were scheduled. The cross coding of selected words secured data for the purpose of the study. Characteristics were identified and the definitions were labeled to provide clarity and identification. In the categorization of themes, the positives and negatives were distinguished.

The reasoning throughout the study was inductive to accurately describe the perceptions as they occurred in the situational context. This process was intended to

support generalized theoretical statements, which lent to accurately developing and modifying the collected dialogs and re-coded the wording into the significant data.

What are teacher's perceptions on Garden Based Education	To assess the impact gardens have on curriculum development	Triangulation of collection method Data will come from... Surveys Interviews Observations	Found through teacher contacts/sample population from initial survey	Time-line August 2011- April 2012
What are the educational, social and philosophical backgrounds of the teachers in the study	To assess the time spent, usage and perceptual-academic importance of the gardens to the teachers	Coding in thematic design as well as fractured-word collection	Schedule interviews for April	Completion of compiled information in EDU 801 and/or deadline of May 4th
Triangulation of domains		Triangulation of Domains 1) Environmental-Degradation - (Pollution) 2) Nutrition 3) Academic-enhancement	Compile all narrative data May 1st	Edit date TBA

Figure 3.1. Data Planning Matrix for logical disaggregation of findings.

The data-planning matrix (see Figure 3.1) that was designed to aid in the construct of the research questions. Each of the components of the methodology was measured for trustworthiness (reliability) and addressed the triangulated study in a logical format.

Triangulation reduced the risks involved in data collection limitation to certain systematic biases or limitations of specific sources (Maxwell, 2006). Due to the limited size of the sample population this allowed for a broader and more secure understanding of the issues within the investigation. The matrix that the researcher designed helped to create a pre-framework format, from which to evaluate the research questions, conceptual framework, survey and interview questions.

### **Issues of Validity and Trustworthiness**

The key variables were identified, and then analyzed. Trustworthiness became a major concern at the initial stage of data analysis, due in part to the depth of understanding and personal nature of the data to the sample population. The researcher had to ensure the research was both reliable and valid. As a Multi-modal case study, the researcher balanced the results of the coding with data from the interviews and observations.

The collection process also included a field data notebook, where the researcher made assumptions, asked further questions and drew conclusion that were separate from decisive findings. Consequently, the researchers' conclusions become highly contextualized. The researcher's outcomes provided support for teaching that emphasizes comprehension and reasoning, transformation and reflection. This emphasis is justifiable through observational data, "by the resoluteness with which research and policy have so blatantly ignored those aspects of teaching in the past" (Shulman, 1986). As is the case with other research methodologies, issues of external validity, construct validity, and trustworthiness were carefully considered.

**Trustworthiness.** The trustworthiness of the measuring procedure yielded the same result on repeated trials. The textual cross coding provided patterning and the measurement tools and procedures yielded consistent measurements. The researcher is able to replicate this study using the tools that were chosen for this study. However, future researchers would be unable to satisfactorily draw conclusions, formulate theories, or make claims about the generalizability (The extent to which research findings and conclusions from a study conducted on a sample population can be applied to the population at large) due to the size limitation of this study. Trustworthiness of this study, was defined by the researcher, as containing four key components:

First there was equivalency, or the extent to which two items measured identical concepts at an identical level of difficulty. This was determined by, relating two separate interviews through a thematic approach and highlighting the degree of association. A correlation coefficient was present. The researcher used triangulation to assess the correlation between individuals surveys, interviews and finally in field actions, through observation. The researcher concluded there was poor equivalency trustworthiness between the actions and the textual and verbal responses. In other words, physical activity did not always correlate to the perceptions the teachers had of themselves, observation was not a reliable predictor of teacher perceptions.

The second theoretical method as an instrument was stability trustworthiness, or test-re-test trustworthiness. This delivered significant agreement of measurement outcomes over time. The triangulation of repeated themes were compared and correlated with the initial survey questions to give a measure of stability. In the cross-coding similarities and differences were carefully aligned to provide this measurable outcome.

The third area to be addressed was measuring the internal consistency of verbal responses. The precision of the observer/researcher along with the measuring instruments used in a study, interpreted data and assisted in predicting the value and the limits of the relationship among the variables. Analyzing the internal consistency of the survey items in positive and negative contexts, revealed the extent to how teachers perceived GBE at the emotional level

Finally, the researcher addressed issues using an interrater trustworthiness (concordance) model to measure the consistency of the implementation of the coding system. Looking for consistency in Likert scale responses from the initial survey, allowed for interrater trustworthiness. Since interrater trustworthiness is dependent upon the ability of two or more individuals to be consistent, this small-scale case study depended on all the data it provided. A follow up activity relied on the interrater trustworthiness data, which provided an argument for professional development.

### **Contextual Codes**

The researcher set out to describe the setting or context descriptors of the phenomenon under study. Given that abundant field notes were taken, codes for specific or regularly occurring characteristics contributed to efficient and effective field note production.

The setting for this case study falls under the title, "empathic neutrality" (Patton, 1990). The inductive data analysis took place at three Palm Beach county schools. The observations provided experiential data of the "human instruments" in these settings, which all had gardens that were completed in the 2010-2011 school year. The settings were all elementary schools and had participation from various grades with a large focus



in the third and fourth grade levels. All the gardens had some level of parent involvement.

Students and adults tilled the land that was utilized for garden development. Through hands on math inquiry and process, problem based learning, there were academic activities built into the construction and formation of the ongoing school garden. The inauguration of each GBE program involved assistants from the local communities. Seed started all the plants and none of the settings had a greenhouse facility. All the settings were in locations with direct sunlight. All interviews took place outside, in or near the garden locations.

### **Perception Codes (Descriptive Analysis)**

The researcher used perception codes to accurately record subjects reported perception, understanding, etc. about GBE and its relativity to people, circumstances, and the environment in the three domains of pollution, nutrition and academic enhancement or enrichment.

A number of criteria were used to assess the researcher's qualitative, descriptive analysis. In grounded theory, inductive theoretical development is critical. In The Discovery of Grounded Theory, Glaser and Strauss (1967) said that generating theory was both an, "exciting adventure" and fundamentally necessary. The editors of the Journal of Contemporary Ethnography, outlined what "readers and reviewers should take into consideration that the most important element was to "have a clear conceptual or theoretical significance" (Adler & Adler, 1995). Therefore the researcher considered a constructivist approach to a perceptual case study, involving triangulated data collection.

Using the Grounded Theory Method (GTM) the researcher took a valuable set of procedures for thinking theoretically about the textual data. The coding process used a search for patterning, both that which is deliberate as well as that which is natural. This was accomplished through a dialectical relationship between induction and deduction. To ensure data collection was thorough, trial and error was evident. The metacognition of data collection provided an emergent, inductive-oriented, and socially conscious framework for the study as a whole. This provided clarity to the participant's connectivity. All the teachers who participated stated they used methods to accommodate lessons for students learning. Those polled in the initial survey stated they all differentiated instruction for their students. They also all said that GBE provides easy access to integration of subject areas in cross-curricular lesson planning. This data was used to design a conceptual framework that could be utilized in every elementary classroom.

The five basic principal deciphered the findings; centrality of language in a social setting, the importance of words as indicators, the significance of empirical and conceptual comparisons, the value of thinking about how variables are linked, and the mechanics and aesthetics of collecting and crafting dialogue. Due to the environmental influences on collecting qualitative data in the form of narratives, the inconsistencies were included in the process. The researcher divided coding into the same three phases that Strauss (1987) and Strauss and Corbin (1990, 1998) suggest, axial coding, open coding, and selective coding.

In using this triadic coding scheme of open, axial, and selective coding, the researcher recognized a cyclical configuration among the three phases, which introduced

an important dynamic to the coding process. The nonlinear nature of the methodology allowed for the clarity of Axial Coding as preeminent in the collection methodology, cycling back to it for validity and trustworthiness.

### **Process Codes**

The researcher paid attention to the naturally occurring systems change, or the process codes. These codes were used to note events or process' that evolved and also track factors which caused or contributed to the evolution. Three critical coding systems were used and cross-referenced.

### **Axial Coding**

The researcher found that the thematic framework for categorization, essential in cross coding, was assisted by the recommendations of Rubin and Rubin (1995) to refine the actual contents prior to thematic placement. The use of propositional statements coupled with pictorial data samples aided in the creation of the categorical framework. The outcome proposition was measured through analysis of the statements (Maykut & Moorehouse, 1994) (see Figure 3.2).

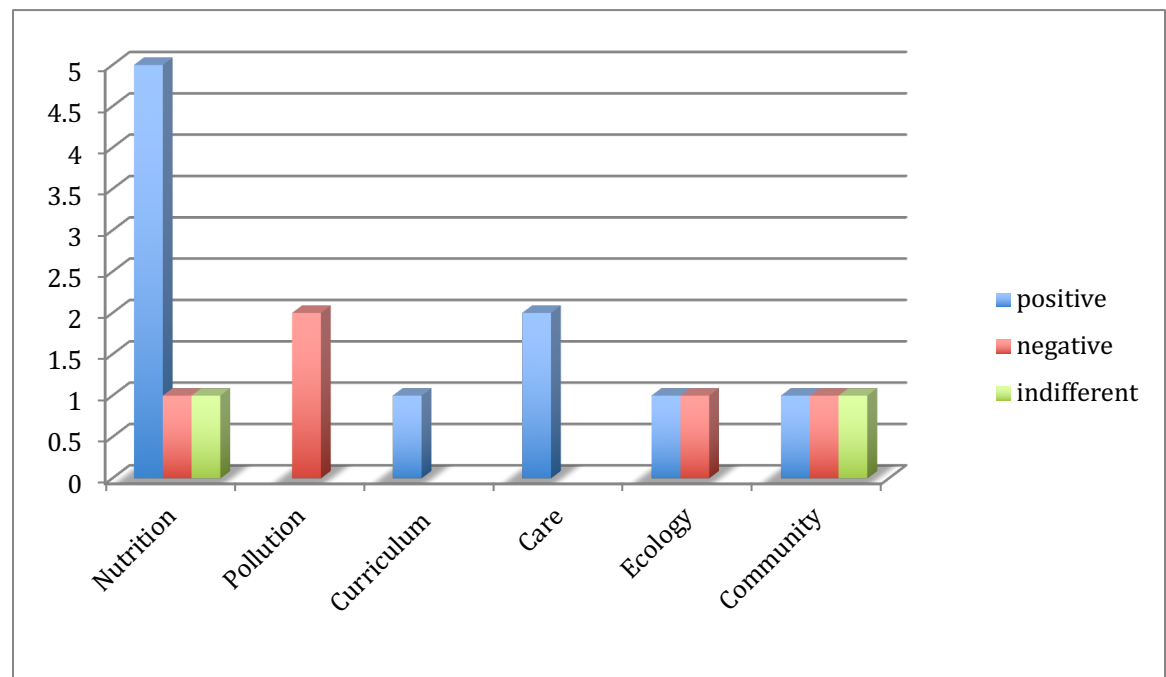


Figure 3.2. Contextual Analyses of Statements in Associative Domains.

### Open Coding

The analysis began with open coding. Glaser (1978) characterized open coding as “running”. The researcher termed this, “Ongoing-Coded-Datum” (OCD) (see Figure 3.3). The research was blocked out of written text and dissected as dialogue; all parts in quotation marks were analyzed, as in “In Vivo” code. The passages were assigned numbers and the numbers all correlated to positive or negative reflective text.

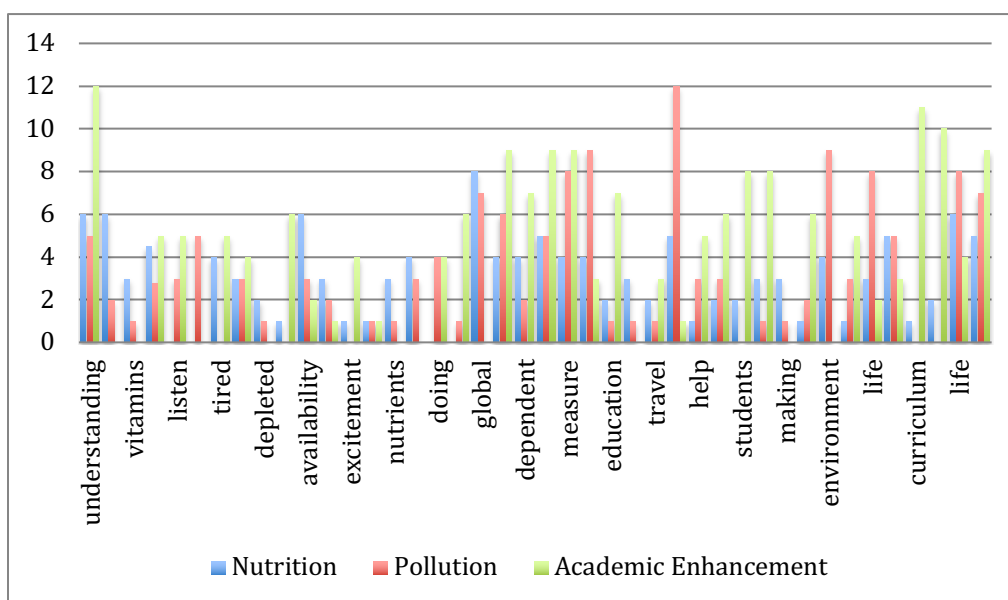


Figure 3.3. Patterning Trends in the 3 Significant Domains.

### Selective Coding

The use of single datum was present in selective or simultaneous coding, where two or more codes within an individual piece of data were analyzed, the researcher found the idiosyncrasies, which were themselves, part of the data and were documented on a separate chart and reflected in the study's limitations (see Figure 3.4). Saldaña (2003) expresses how pattern variations are essential in code-collection. As each piece of code was taken from "teacher-talk", participant's unique language was as much a piece of evidence as was words that exemplified connectivity. Individual attitude, belief systems, and education vary greatly and are identified in response data. Looking at disengagement, enthusiasm and motivation as was done by (Agar, 1996) provided additional factors and elements of the patterning analysis completed for the study.

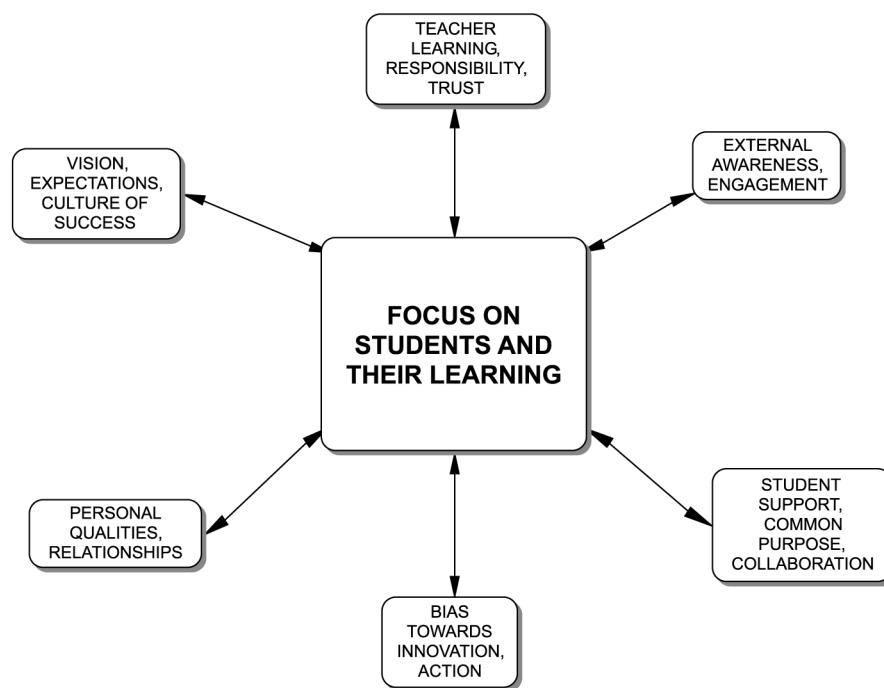


Figure 3.4. Teacher Perception of student patterning.

### Descriptive Inquiry

The participant sample population was obtained from online survey questionnaires, interviews and observations from February to April 2012 (see Figure 3.5). Twelve certified Florida teachers who live and work in Palm Beach County completed the online questionnaire. The data indicated that 4 of the faculty (sample population, participants) have at least 10 years of experience in education and 3 have been involved with GBE for two or more years. Of the 12 faculty participants, 5 agreed to follow up interviews. Two participants were male, and three were female. The educational backgrounds varied. Word choice was cross-coded in axial methods using relationships and clusters. The categorization of properties was evident after careful collection and analysis was completed from the interviewing process. The items were triangulated with words used in the survey questions and the “live-speak” of teachers in interaction with

students in the garden settings. The results were a combination of inductive and inductive/deductive reasoning. The researcher had to wear an analytical researcher's lens to assess the findings. The ability to look at the limited text through grounded theory allowed for "In Vivo" Coding, in axial, open and selective methods.

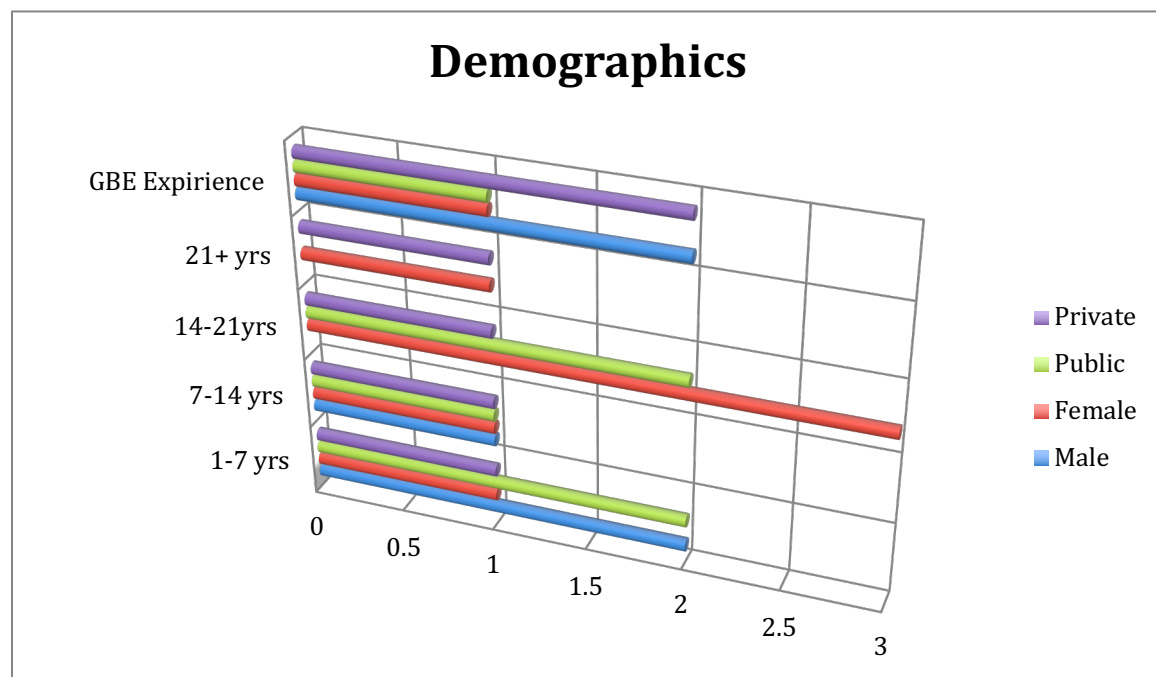


Figure 3.5. Participant Demographic.

### Ethical Considerations

The study took a conceptualistic or holistic qualitative stance, describing and understanding events, actions, and processes in the natural context in which they occurred. No attempt was directly made to generalize to a larger population. However, later a replication may provide a larger context, applicability. Informed consent, from

persons capable of such consent, was obtained. This required informing participants about the overall purpose of the research and its main features, as well as of the risks and benefits of participation, prior to the interview schedule. Consent was given in written format.

The investigators' responsibility to the participants included issues such as ensuring confidentiality, avoidance of harm, reciprocity and feedback of results. In ensuring confidentiality the investigator did not report private data that identifies participants. Anonymity was guaranteed, names were not recorded and categories of sensitive information requiring anonymity were excluded, i.e.; sexual attitudes, preferences or practices; use of addictive substances; illegal conduct; information that could damage an individual's employability, or reputation; medical record information that could lead to discriminatory situations, and information about mental health. The benefits of feedback to the participants have outweighed the risk of harm in the qualitative interviews. Sensitive topics were null. Emotional response from a participant was guarded with a referral specialist; a school counselor, and authorities were readily available and responsible for responding to possible illegal conduct.

### **Self-Report Bias**

The subjectivity (bias) of the researcher was inevitable in the processing of each element of datum due to the context and the investigator's involvement in the active context of the completed study. It was impossible to negate the issues of bias, as they were imbedded in the researchers theories, beliefs and perceptual "lens". The self reported bias-outcomes were both, a positive, and a negative influence on the findings, and are important elements to the general data collection.



## **Reactivity**

The first issue dealt with was one of reactivity. However removing the investigator is impossible and the goal in qualitative research is *not* to eliminate this bias (Hammersley & Atkinson, 1995). Therefore, the reactivity was used in the following manner as a productive, inclusive element to the data.

1. The word choice in both survey and interview questions noted as provisions of the researchers text.
2. Documentation, when interview questions were given and stresses were heard on certain words as the questions were read, was included.
3. The researcher, having the final say on certain inclusion and deduction of text, assumed pedagogical importance to the study.

## **Reflexivity**

Second there were setting and timing biases, due to the participant's schedules and the researchers time-line. The study was limited in its scope. The researcher was part of the environment where the sample population was gathered, creating inescapable influence. What the informant reports is *always* influenced by the interviewer in the setting or situation, referred to as "reflexivity" (Hammersly & Atkinson, 1995). The researcher took care *not* to allow leading questions to arise, attempting to minimize the bias effects. Inferences were drawn from both demographic comparisons and dialectic cross coding.

## **CHAPTER IV: RESULTS**

### **Best Practices and Outcomes**

This chapter represents the collection of data found as a result of a teacher perception study, including analysis of monologues that were recorded. The chapter starts

with a description of the results from the research questions, initial inquiry and coding methodology used in data collection for a study of Garden Based Education (GBE) as it relates to perceptions by participatory teachers. The next section is a comprehensive explanation for the demographic data on the participants and the setting of the study. The third part of this chapter is a brief explanation of the researcher's bias, which is embedded into the grounded theory methodological design. This chapter concludes with a summary.

### **Research Questions**

1. Do teachers perceive students participating in school garden programs as having a better understanding of the changing conditions and degradation within global environments?

As the respondents completed the survey it was clear that there were mixed results to the findings. The formulation of interview questions, to specifically target this research question, grew out of the responses to survey question number 12, "Does your personal belief system influence your perception on the environment as a whole? Elaborate." The cross-referencing of the following lead to the research question number 1 as it was directed specifically at the teacher being asked the question.

"I think so. I think your perception about anything is based almost solely on your personal beliefs. I was born on a farm, spent most of my childhood in fields and forest, and gardened because that is what you did. Even though there was the grocery store we went to, we always valued our own crop and livestock as superior to what we could purchase. After school (and work for the adults) spring was spent preparing the soil and planting, summer was spent ensuring proper growth, fall was for harvesting and

caning/freezing, and winter (as well as all other times of the year, but winter especially) was spent cutting wood to burn to heat the houses.”

This response allowed for more in-depth questioning in the interview that lead to significant correlations between participants, their perceptions of the natural world and the importance they felt toward knowledge, preservation and eco-literacy within the educational context.

### **Interviews**

Interview a) “I believe that there is a very serious connection of the individual to his/her environment that needs to be cultivated and modeled within the curriculum.”

This idea of connectivity between self and environment raised another point to emphasize on the “In Vivo” coding matrix.

Interview b) “I believe that the earth is in need of protection from over development and man's desire to acquire its precious bio-products. We must educate our youngsters to respect and care for the natural world. Nurturing the earth through school gardens and emphasizing a curriculum based on growth, change and science, language arts, fine arts and humanism is all essential.”

The teacher feedback that was collected shows a concern for both what students lack in their socio-environmental understanding as well the belief that learning can be enhanced through integrated studies.

**2.** Do teachers perceive students, participating in gardening, as comprehending the importance of nutrition and sustainability?

Interview c) “I try to think of the environment in many aspects of my daily life: shopping, eating no meat, conserving electricity and water, making as few trips by car

each day as needed, contributing to organizations that help the environment, recycling, and making students more aware of how they can also be guardians of their world.”

The addition of personal diet choice played a role in the study, specifically when attributing perspective to sustainability issues both locally and globally.

### 3. Do teachers perceive students show greater motivation in multiple disciplines, through school gardening?

Interview d) “My perception that students should learn to be good stewards of the earth through engaging them in curriculum that elaborates on real world issues, stems from my own wonderful education. Both my up-brining (parents) and my schooling greatly affected my choices to go into education, to choose an independent school as a career destination and to enforce global mindedness in the way I teach!”

The perception by the teacher-participants was considerably in favor of the theory that eco-literacy brings about heightened academic motivation. However, the time, money and manpower constraints were a constant theme throughout the interview process. Connections between these contemporary teacher’s points of view, compared with John Dewey and Friere’s work a century ago, shows poignant irony.

### **Initial Inquiry**

The researcher used a method of connectivity to assess the data. Theoretical categories place the data in a more abstract framework (Dey, 1993). These categories or, “clusters” were formed concurrently with the data collection. An analysis in separate categories was used for coding purposes. The connections did not look simply at similarities or word matches but were cross-coded by categories independent of context. The relationships that existed connected statements with events, activities with beliefs.

Instead of fracturing the text into discrete segments the researcher used connecting-analysis, in order to holistically approach the data collection method. The study integrated both etic and emic aspects, looking at data in comparison to prior research from the literature review and from the data collected by the researcher (Atkinson, 1992; Mishler, 1986). This was an attempt to avoid limitations and give a broader, more generalizable, theory of what was happening (Maxwell & Miller, 2006).

### **Main Analysis**

The model of the research design was interactive as well as systemic. This clearly defined the structure as both interconnected as well as flexible. The study matrix was created with 5 concepts for its design. First there had to be “goals”, the interview process reflected Problem Based Learning, (PBL) enhancing the contextual elements of constructivism. The nature of the dialogue in the PBL tutorials was a process by which the teachers, along with the students, created and recreated knowledge. The use of dialogue was essential in collecting and documenting effective strategies for this study. “True dialogue unites subjects together in the cognition of the object that mediates between them” (Freire, 1985) (see Figure 3.6).

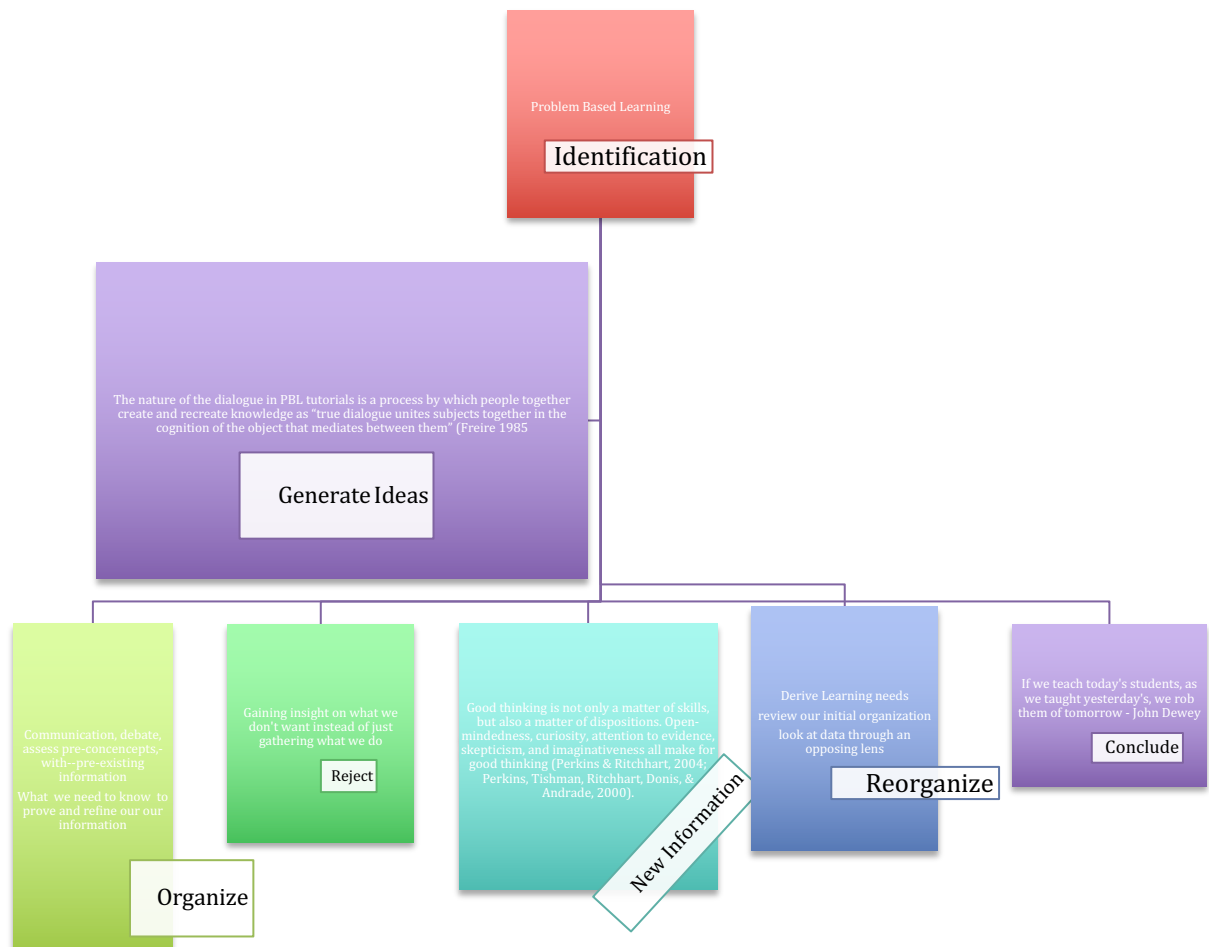


Figure 3.6. Problem-Solving Contextual Framework.

## Findings

Data was collected in face-to-face interviews with the sample participants, all were audio taped and two were filmed. These interviews involved unstructured and

generally open-ended questions that were few in number and intended to elicit views and opinions from the participants (Patton, 1990). According to Patton (1990), the root of an in-depth interview is an interest in understanding the lived experience of other people and the meaning they make of that experience. The researcher used Dragon speak as a recording device, as well as a secondary tape recorder. Difficulty was discovered in respecting the interviewee's uncorrected speech and listening without interfering.

Problem based inquiry was a significant reoccurring theme of the teachers who were interviewed. Figure shows terms and words used more than 5-7 times by each of the interviewed persons. The enthusiasm with which the teachers spoke of these steps that their students took was evident in the rise and fall of vocal-intonations.

Age breakdown showed the predominant teaching age was 25-34. Those who had no experience in GBE cross-calculated the number of participants who had participated for 2-5 years in school garden curriculum. This led to interview questions that asked whether or not the teachers were interested in participating in professional development that used GBE, or, wanted to use their experience to write a piece for curriculum development. The teachers overwhelmingly wanted the curriculum developed prior to lesson planning, and developed by an outside entity. However they wanted freedom to edit the curriculum to fit their individual classroom environment. Again the stress was placed on "time" as a constraint to their involvement in lesson configuration, conception and design.

Time was a significant area of concern in every interview. 42% of the participants polled in the initial survey stated they had no experience with garden based curriculum development. The question that read; "indicate the amount of time spent implementing



GBE”, presented a majority response of 42%, statements that the garden was only a part time endeavor was a significant data point, the explanation reflected time restraint. This lead to an interview question, that asked whether or not the garden would be a fiscally sound decision for a school. The pros and cons from the answer, was placed in a chart. This was again cross-referenced to find the number of positive and negative responses to the financial aspects of school garden programs and projects.

Every teacher who participated claimed to differentiate their teaching styles, to accommodate the students in their classroom, and to individualize lessons. This prompted the researcher to ask if they would differentiate GBE. The question was raised whether or not it is necessary to do so. The responses were mixed and presented in table 4.1. Interestingly art was the most favored subject area of the teachers who were polled, this lead to an open-ended, interview-discussion of garden design.

### **Chapter Summary**

According to the findings presented in this study documents and observations of the pre-post garden experience did not provide immediate student feedback. However, the teacher perception collection did glean positive cross-coded results. The findings were presented both thematically and by research question. The data from this case study, viewed through a lens of grounded theory, outlines the basic characteristics, which formulated the overall perspectives in the field.

## **CHAPTER V: DISCUSSION**

### **Impacts, Outcomes, and Future Directions**

Earlier chapters of this document analyzed the arena of environmental education in its various forms. The concept of GBE is both old and new (Lawson, 1999). The several specific studies were cited. In this chapter the researcher takes a broader view addressing some of the results of the practice, as well as new trends and possible future applications.

This chapter provides a discussion of the findings. The chapter begins with a summary of the study then presents the conclusions in terms of the relationship of the findings to the theoretical foundation and to the literature, as it addresses GBE, in the three focus areas presented in the study. This is followed by the strengths, weaknesses, and limitations and finally the implications for further study.

The chapter concludes with recommendations for changes in theoretical constructs, for changes in educational practice, and for additional perception studies regarding school garden effects. The recommendations are developed out of practitioner's actual experience and are immediately applicable. This study used critical theory to identify the inequities that may exist in GBE, with the conviction that the lessons learned through the use of GBE can provide social reform on a local and global scale.

Data for this qualitative descriptive case study were collected within a specific context. The data was triangulated to insure greater trustworthiness (validity and reliability). The triangulation helped the researcher develop a greater understanding of the dynamics present within the constrained context. The methodology enabled the

participants to share their perceptions of, and experiences in GBE. The methodology provided a framework for the researcher to determine emergent themes that attended to the research questions throughout the study.

### **Summary of the Study**

The purpose of this descriptive case study was to examine the perceptions and experiences of the teachers in schools with student grown gardens. The research questions were:

1. Do teachers perceive students participating in school garden programs as having a better understanding of the changing conditions and degradation within global environments?
2. Do teachers perceive students, participating in gardening, as comprehending the importance of nutrition and sustainability?
3. Do teachers perceive students show greater motivation in multiple disciplines, through school gardening?

This research was guided by three pre-identified themes of inquiry, environmental degradation, nutrition awareness, and academic enhancement. The literature indicated that providing themes of study based around a concern for nutrition, environmental degradation and academic enhancement, would lead students in a problem solving direction.

**Relationship of the Findings.** Grounded theory was selected as the theoretical foundation because this study explored the perceptions of teachers in a specific context. The purpose was to explore strengths and weaknesses and to empower the participants with an active role in social reform where desired (Patton, 1990). Environmental

Knowledge and Awareness was seen as an element of metacognition. The ability to create a strategy for providing the necessary steps needed in problem solving and to reflect and evaluate the effectiveness of our own thinking (Costa & Kallick, 2011).

Reflection of the teacher participants to the understanding of sustainability in a local and global sense was obvious in their involvement with their school garden.

**Practical Application.** The garden provided a stage for students to practice a guided understanding of the importance of a sustainable society. The dichotomy between; teacher's who availed themselves to the garden and immersed themselves in GBE, compared with those who dabbled or ignored the outdoor learning opportunities was apparent in the data (Orr, 2009). The roots of sustainability are powerful tools for defining the problem of sustainability (Hobson, 2006) (see Figure 5.1). These roots, consisting of at least the economic, social, and environmental factors of society, perform as avenues for situational change. If any one pillar is weak then the system as a whole is unsustainable (White, 2000).

1. Renewable resources are the roots to any society, the rate of harvest should not exceed the rate of regeneration to provide a sustainable yield.

2. Pollution is equal to the rate of waste generation from projects that exceeds the assimilative capacity of the environment (sustainable waste disposal). Therefore, the depletion of the nonrenewable resources should require comparable development of renewable substitutes for that resource.

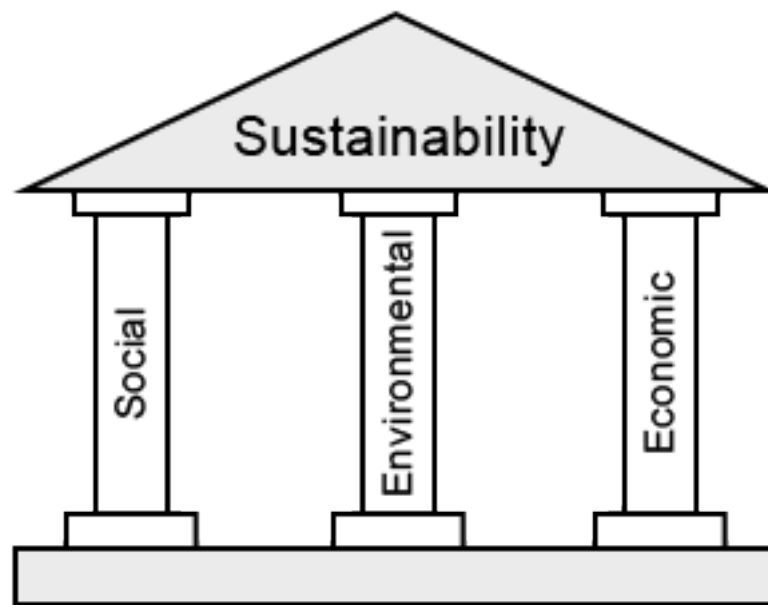


Figure 5.1 The Roots of Sustainability. Defining the problem of sustainability (Hobson, 2006).

The literature review of this research dissected the historical perspective of GBE. In 1967 White wrote an article entitled, "The Historical Roots of Our Ecological Crisis", which was published in *Science Weekly*. In this article, he said that the Western world's attitudes towards nature were shaped by the Judeo-Christian tradition. The first compulsory education laws were passed in Massachusetts between 1642-1648 (Meyer, 2002). The law was intended to focus attention on students whose parents were not providing them with a religious education. White suggested that Islam and Marxism were further causes of historical, human, perceptual bias.

The researcher connected the significance of this tradition, involving the concept of a world created solely for the benefit of man: "God planned all [of creation] explicitly for man's benefit and rule (White, 1967) to the perceptions that the participants initially had. According to White, modern-western beliefs separated humans from nature. In older

religious traditions, humans were seen as part of nature, rather than the ruler of nature. In contrast with paganism and Eastern religions, Christianity "not only established a dualism of man and nature but also insisted that it is God's will that man exploit nature for his proper ends" (White, 1967).

The conceptual framework that grew out of teacher's perceptions explored the theories associated with education as a tool (similar to White's analysis of nature existing for man's benefit) in contrast to learning as being a symbiotic relationship with living. The data exhibited teacher's concern and interest in a more cohesive natural school setting, coexisting with nature. The setting provided a less totalitarian and more cooperative educational environment. However, time constraints were reoccurring themes in all the interview sessions. This theme seemed to restrain the participant-teachers (who showed a passion for outdoor classroom, hands on learning) and limited their engagement in GBE and a more holistic teaching approach.

### **Constructivist In Methodology**

Data suggested the constructivist approach to, both the design methodologies as well as the conceptual, curriculum format, aligned systems analysis and holistic thinking. Systems Thinking stems from the "art and science of making reliable inferences about behavior by developing an increasingly deep understanding of underlying structure." (Senge, 1999). The participant's cross-coded statements of significance correlated the importance of "problem solvers" as a desired outcome of general education. The intuitive use of a mental model that illustrates both the need for students to *know* how to problem solve and see the world as a complex system, where all behavior is controlled through interaction with symbiotic systems, resonated with the participant population. The

consensus was that, constructivist-learning approaches provide feedback loops, which interact to drive a system's behavior. In each of the school settings teachers felt supported by the administration, the leadership embraced a systems approach to instruction.

This constructivist model of thinking is preferred over a, *holistic* design, which has looser and more intuitive meanings, and emphasizes understanding the whole rather than the dynamic structure of the system. GBE provides this structure in a clear cross-curricular manner. The perception's of the sample population provided definite feedback that project-based learning works (Meyer 1997). The perception was supported on a multitude of levels, in varying subject areas within a System's Thinking framework. The perception study's cross referencing of words, terms, emotional and theoretical responses created a web of how dispositions to both understand and act creatively, provides global significance. The obvious benefits are interrelated to the environmental and biological wellbeing of a community. Farming as part of a democratic society is clearly not understood by a majority of citizens. 82 percent of the world's population was rural in 1950, by 2050, 68 percent of world's population will be urban according to the United Nations (see Figure 5.2).

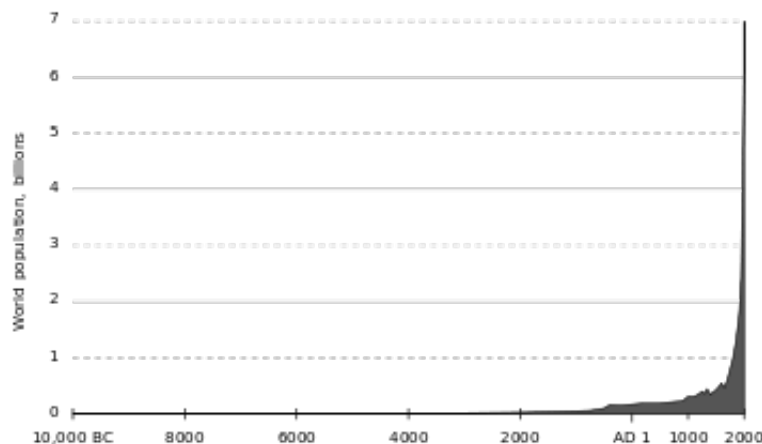


Figure 5.2. Two methods for preserving agricultural land at the urban fringe: Use-value assessment and transferable development rights (Schwartz, 2003).

As the world's population shifts from rural to urban, we become divorced from the realities of how challenging it is to produce food (United Nations, 2007). Food production is a constant struggle against the vagaries and whims of Mother Nature and competition from other organisms. People isolated from producing their own food don't understand and appreciate the damage insects and disease can cause to crops and livestock, the impact of a drought or too much rain, and/or the capability and limitation of land. According to the data in this case study, school sites avoid a basic understanding of nutritional sustainability.

In Peter Senge's highly influential *The Fifth Discipline Fieldbook*: research showed the significance of reflection. The data from this grounded theory, perception case study, provided follow up measurement tools that fell into Senge's categorical frame, from the viewpoint of problem solving, a *complex system*, where behavior cannot be easily predicted from inspection, the system utilizes a cyclical methodology. Therefore, in GBE, the garden is the continuous loop (as the educational tool itself) a constantly growing and changing material. All processes associated with garden based



education function with the understanding that learning isn't stagnant. Findings showed teacher perceptions toward Solutions to problems, are often best implemented with the understanding that change occurs along with societal changes. Ills in schools are reflective of ill in society and traditional approaches to education can be both archaic and invalid as well as imperative and influential

### **Environmental Understanding**

Within this case study analyses, ecological investigations were featured alongside the physical sciences, life sciences, and earth and space sciences. Where teachers addressed student knowledge, the outcomes were mixed in the perceptions of student understanding. However in student engagement, motivation and cooperation, the gardens were (across the board) considered an improvement to the preexisting curriculum.

The researcher found that perception data on the importance of understanding the human-built world (as agrarian societies developed) and the value of teacher observability (while comprehending such large-scale concepts) was collectively positive. The consideration for a framework as a broad description and eventual tool of the content and sequence of learning expected of all GBE students was varied. The belief that students should understand issues related to environmental degradation, childhood-nutrition was consistent. However the means to the end were not aligned (Perkins & Ritchart, 2004). Ecological factors looking at time and landmass were considered great tools for curriculum-development in teacher data. Visuals for addressing this area of learning were reported as being brainstormed by students themselves.

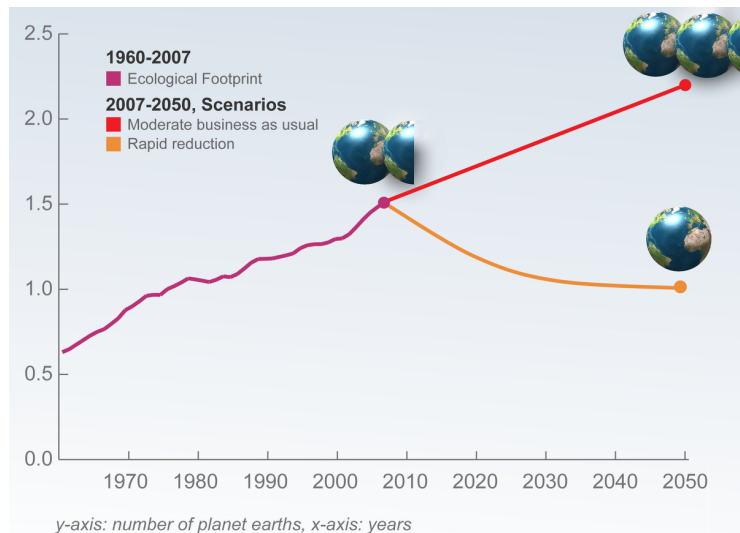


Figure 5.3. Ecological Foot print Time Line (Oluk & Özalp, 2007).

### Nutritional Knowledge and Awareness

Teacher participants were in agreement that students grew a greater understanding of nutrition and nutritional values from experiences where food comes from. The various scientific lab workshops that grew out a makeshift GBE curriculum at one school allowed students to see the caloric intake of different raw (whole) foods in comparison to pre-packaged highly processed foods. The teachers had students design posters and make a campaign for “eating healthy”. Teacher’s perceptual data measured how they felt, the result was, and empowered to be strong leaders when students and parents supported the efforts to grow fresh vegetables and have them served in the school cafeteria (see Figure 5.4).

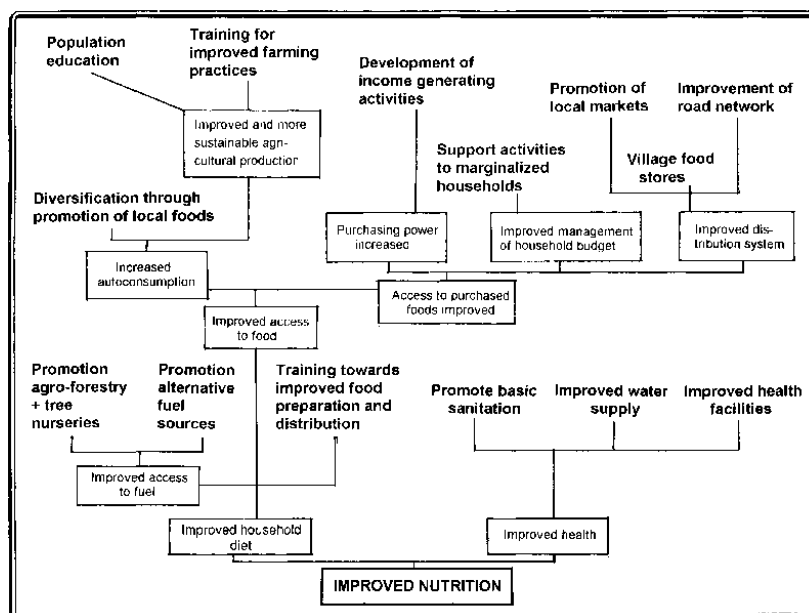


Figure 5.4. Flow chart of goals: Identifying activities to improve nutrition. Food and Agriculture Organization (U.N., 2007).

### Academic Enhancement Beliefs

The breakdown of what was collected and most frequently addressed, fell into a quadrilateral matrix:

- 1) Global investigation
- 2) Perspective taking
- 3) Communication
- 4) Project based Action

**Global Investigation through GBE Academic Enhancement.** According to the positive responses on cross-curricular activities, teachers were able to identify students gained knowledge in the areas of inference and inquiry. The participants commented repeatedly on their students being able to identify issues from the school garden that were reached more broadly into regional and global locals, creating their own researchable

questions. Social and scientific aspects of global society were taught through GBE at the 4<sup>th</sup> grade level with advanced curriculum enhancements.

Teacher Participants were quoted as stating that their students were able to augment their vocabulary utilizing scientific as well as domestic and international language. This paralleled with the investigations conducted by Cross (2006) where he stresses that most “learning” on the job is informal, hence the paradigm shift essential in new thinking practices in academic settings.

The responses, which were collected allowed for cross coding of the inclusion of garden based research, using the Internet. The outcome of participant’s success in GBE provided students with the ability to analyze, integrate and synthesize evidence collected to construct coherent arguments. These are tools that Dewey emphasized a century ago, “Every great advance in science has issued from a new audacity of imagination” (Dewey, 1917). The teacher’s responses correlated students having a greater ability to develop arguments based on compelling evidence, understanding the importance of such a structure and taking into account multiple perspectives to draw defensible conclusions.

### **Strengths, Weaknesses, and Limitations**

**Strengths.** The study was both a theoretical approach to data collection in a specific case study, providing clear visual and concrete measurement through the collection process, i.e. Surveys, interviews and observation. The qualitative design allowed for an organic emic perspective to be combined with the etic perspectives of participants. The traditional criteria for validity is based in a positivist tradition, and to an extent, positivism has been defined by a systematic theory of validity. Within the positivist terminology, validity resided amongst, and was the result and culmination of

other empirical conceptions: universal laws, evidence, objectivity, truth, actuality, deduction, reason, fact and mathematical data to name just a few (Winter, 2000). However, in the grounded theoretical approach to a qualitative case study, the validity and reliability fell into a holistic design known more commonly as, “trustworthiness” (Joppe, 2000). The findings were collected and cross-coded to support the holistic, positivist theories seen through the grounded theory lens, allowing the selective coding to guide the sensitivity of narratives. The covariance of two variables, identity (self-concept) and professionalism were additionally analyzed.

**Weaknesses.** The problems in systems therefore cannot be solved using intuition and our everyday problem solving methods. The use of intuitive methods to solve difficult complex social system problems is a common trap; so common the entire environmental movement has fallen into it. Only analytical methods using tools that fit the problem will solve difficult complex social system problems. Chapter three documented the data and analyzed one datum, the personal subject preference data, which may have affected a significant bias within the target population’s perception of GBE.

Although the data collection provided written survey responses with detailed description, due to the anonymity of the online surveys the cross coding was inefficient in certain domains. Another weakness was the size of the sample population. There were only 12 initial surveys and only 5 participated in the interview and observation process. A larger sample size may have yielded a deeper insight into a greater cross section of the population utilizing or experiencing GBE. A larger teacher sample population and participatory-group, may have identified additional inconsistencies in the belief of school gardens as teaching tools.

**Limitations.** This qualitative descriptive case study was limited because the researcher interviewed only teachers in the context, which excluded the students' voice. Maintenance of school gardens was an issue. Data concluded that it is essential to view school gardens as integral parts of the educational plan for the school, as a classroom onto its own, and financed accordingly as part of the overhead of operations. Long-term sustainability is in jeopardy if maintenance is not carried out, causing possible burdens on departments not involved in the implementation, such as administration and custodial staff.

In some cases access to the garden, for community and parent participation, was difficult due to landscaping, placement and security. The data provided significant findings that GBE required significant time and manpower to be successful. Student involvement is critical in the success and completion of a fully functioning school garden, and student hours beyond the designated school day is often critical.

Gardens provide a less competitive model for academic attainment. However, assessment tools must be clearly defined. A weakness in measuring assessment can be found in GBE that does *not* take a serious approach to follow up lesson evaluations.

## **Recommendations**

**Changes in Theoretical Constructs.** The theoretical constructs were able to describe systems analysis, through the constructivist method. Data conquered that Garden Based Education provided experiential learning tools. GBE is a process through which a learner constructs knowledge, skill and value directly from an experience within the garden environment. Content learning within the garden occurred when a carefully constructed curriculum enhanced, anticipation, reflection, critical analysis, and synthesis

of academic and social learning. The theory on GBE changed from a strictly concrete physical activity that provided clear parameters of learning, to an abstract cognitively stimulating and expanding learning environment.

The theories when applied to the actual practice of building, digging and harvesting within a garden setting, changed due to numerous variables. The student populations changed throughout the year, so that various children could be exposed to the gardens. The teachers outside influences and pressures; effected the preconceived theoretical constructs. The environmental conditions and weather changes as well as maintenance are causes for the actual garden to yield more or less product, eventually effecting student and teacher perceptions, comprehension and assumptions.

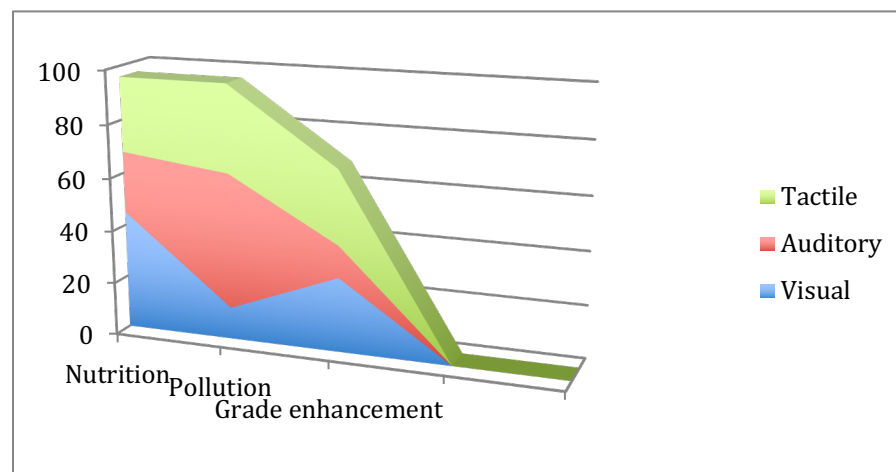
### **Implications**

The applicability of this case study can be seen it's timely importance. However, the chronology of the garden based educational movement is not as important as the underlying implications and motivations that lead educators, parents and public officials to see how the greater understanding of our environment and environmental factors are critical to our social capital. Various important names in education have provided the platform for mainstreamed GBE curriculum in U.S. schools. Dewy, Kilpatrick and Cuban are all outspoken theorists, recommending an ongoing cycle of education reform that focuses on the importance of project based learning and comprehension of the world in which we live, coexist and produce (Meyer, 1997).

When comparing the vocational and practical side of GBE to the academic, the data provided an interwoven contribution to all aspects of learning. The data can be read and dissected providing outcomes that clearly state the participants feel the

implementation of GBE has a positive influence in basic education. The question raised then is asking, why hasn't the pedagogy of GBE been institutionalized into the education mainstream?

When looking at the effects of GBE in developed or developing economies outside the U.S. the contributions to basic education are significant when the developed curriculum addresses “best practices”, with regard to planning and implementation. However, in this study, the conceptual content implemented, was only carried out by select individuals in the school, not the whole educational community. This limited the support of the program.



Changes in Educational Practices. Figure 5.5.

Additional perception studies regarding school garden effects as a paradigm shift in educational practices were collected for a future replicated study. The most important measurement that was not included in this study was the perspective of students in GBE. This was seen as a limitation to the study, and reflects the limitations in getting student feedback in general classroom learning.



## **Future Research**

Future researchers should consider looking at student responses to a child-perception study and/or possibly parent perception studies, where responses are gathered and analyzed. The actual settings used in this study, was a perennially tropical environ; this study would look significantly different in locations that had shorter growing seasons and different climate issues.

A continuation or replication of this study with several schools in the Palm Beach County public system is a suggestion that would provide possible benefits to district campuses, as gardens would be constructed on the grounds of various schools. The schools included in the study could be asked what curriculum benefits they might see if they *had* a garden at their disposal and how they feel a garden might best be used as a teaching tool, prior to the implementation of a school garden.

Additionally a study conducted utilizing quantitative data to measure outcomes of GBE in the elementary education programs of specific district schools, as well as the middle and high school curriculum, could be carried out. All the possibilities for future studies have a wealth of information, with material covering; basic gardening, school gardens, educational grounds, “greening”, sustainability, nutrition through environmentally sound education practices, experiential-constructivist approaches, and project based learning.

In an attempt to broaden the global dialogue on the benefits of GBE, attached is a listing of several organizational-resources available to aid in the expansion of future studies (See Appendix C). The researcher’s hope is to see the issues and concerns that grew out of this study addressed through further investigation.

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## APPENDIX A

Inside the Garden Observation

&

Analytic Protocol

Data Collection for Study Conducted by Jennifer E. Tinker

Lynn University 2012

Observation Date \_\_\_\_\_

Time Start \_\_\_\_\_ Time End \_\_\_\_\_

School \_\_\_\_\_

District \_\_\_\_\_

Teacher \_\_\_\_\_

1. Teacher Gender:

2. Teacher Ethnicity:

American Indian or Alaskan Native

Asian

Hispanic or Latino

Black or African-American

Native Hawaiian or Other

Pacific Islander

White

3. Subject Observed:

4. Grade Level(s):

5. Course Title (if applicable) Class Period (if applicable):

Students: (Number):

## APPENDIX B

### Green Schools of Excellence Award Program

#### What is the Green School Recognition Program?

The Green School Recognition Program recognizes public and private schools that encourage cultures of sustainability within their school environments. This program recognizes K-12 schools that have made strides in:

Making school grounds enhancements that encourage the use of the grounds as a learning environment and enhance the areas ecological integrity.

Enhancing school sustainability through the conservation of energy and water and the reduction of solid wastes.

Integrating curriculum that will prepare students to understand and act on current and future environmental challenges facing South Florida.

Involvement with the community that fosters partnerships within the school building and local organizations in an effort to create an awareness of environmental issues between the school and the community.

Administrative support through active professional development and the creation of a school philosophy and culture that embraces sustainability.

#### Who is eligible?

All public and private K-12 schools in Palm Beach County.

#### What's in it for us?

Visibility as a model for sustainability in your community and among Palm Beach County schools

Invitation to the Green School Awards Ceremony

Top green schools will receive cash awards

Green School flag for Green Schools of Excellence

Certificates

Media recognition

Green Seed Money

#### What are the levels of Green School recognition?

The goal of this program is to recognize schools that have made efforts to create a culture of sustainability within their school environments. Schools will be judged on six categories and will be given points based on the Green School Rubric of categories and indicators. There are three levels of recognition for a Green School:

Program of Promise: A school that has scored 40-59 points and is taking the beginning steps to improve sustainability.

Program of Quality: A school that has scored 60-79 points and is taking active strides in improving and maintaining sustainable practices.

Program of Excellence: A school that has scored 80-100 points and shows the highest level of commitment to sustainability.

How can my school apply?

Before you can submit your application, someone from your school must attend the Green School Workshop (this is mandatory for all applicants). The workshop will give you the basic information you will need to help your school take successful steps towards sustainability. The application can be downloaded here. The major components of the application include:

A cover sheet completed and signed by the principal, SAC chair, and two lead teachers.

A narrative summary of your schools green activities.

Documentation of all required criteria for recognition.

When are the applications due?

Applications are due **DATE TO BE ANNOUNCED**.

**When will recognition be announced?**

All schools will be notified of their status by **DATE TO BE ANNOUNCED**.

**Where can my school get help?**

For information regarding the application process and the workshop please contact Susan Toth:

**Pine Jog Environmental Education Center** 6301 Summit Blvd West Palm Beach FL 33415  
(561) 686-

**APPENDIX C****ORGANIZATIONS**

Center for Eco-literacy Zenobia Barlow  
<http://www.ecoliteracy.org/about-us/board-members>

Food Land and People  
Presidio  
<http://www.caflp.org>

MOVIUM  
Center For The Urban Environment Sweden  
<http://www.botsfor.no/publikasjoner/Litteratur/New%20Urbanism/The%20Urban%20Agenda%20by%20the%20Swedish%20Urban%20Environmental%20Council.pdf>

National Gardening Association  
11000 Burlington VT.  
<http://www.garden.org/>

**WEBSITES**

American Botanical Society  
<http://www.botany.org/>

School Gardening Resources  
Journey to Forever  
[http://www.journeytoforever.org/edu\\_garden\\_link.html](http://www.journeytoforever.org/edu_garden_link.html)

The White House Organic Farm Project  
<http://www.thewhofarm.org/>

Junior Master Gardner Program  
<http://www.jmgkids.us/>

**PRINTED MATERIAL**

UC DAVIS  
Center for Nutrition in Schools  
<http://cns.ucdavis.edu/resources/garden/index.cfm>

National Gardening association  
<http://assoc.garden.org/>

**PERIODICALS/NEWSLETTERS**

NSTA Science and Children  
National Science Teachers Association  
<http://www.nsta.org/elementaryschool/>

Growing Ideas

Environment & Technology  
<http://www.growing-ideas.co.uk/>

Healthy Kids Healthy Communities  
<http://www.healthykidshealthycommunities.org/>

Baytree Designs Asphalt to Eco-Systems <http://www.asphalt2ecosystems.org/>

## **APPENDIX D**

### COMMITTEE APPROVAL I



## LYNN UNIVERSITY

3601 North Military Trail  
Boca Raton, FL 33431-5598

Via Email: [REDACTED]

November 8, 2011

Jennifer Tinker  
[REDACTED]

Dear Jennifer:

The submission that you have submitted, "Investigation of Teacher Perceptions on School Gardening Programs" has been granted for expedited approval by the Lynn University's Institutional Review Board.

You are responsible for complying with all stipulations described under the Code of Federal Regulations 45 CFR 46 (Protection of Human Subjects). This document can be obtained from the following address:

<http://phrp.nihtraining.com/users/login.php>

Form 8 (Termination Form) IRB Form 8: IRB RepForm 8 (Termination Form) IRB Form 8: IRB Report of (.pdf, 162K) needs to be completed and returned to Ms. Teddy Davis ([REDACTED]) when you fulfill your study. You are reminded that should you need an extension or report a change in the circumstances of your study, an additional document must be completed.

For further information, please click on the following

<http://www.hhs.gov/ohrp/humansubjects/anprmchangetable.html>

Good luck in all your future endeavors!

Warmest regards,

*Dr. Theodore Wasserman*

Dr. Theodore Wasserman  
IRB Chair

Cc: Dr. G. Cox  
File #2011-016  
Dr. A. Kosniztky  
Dr. V. Storey

/td

## APPENDIX E

### COMMITTEE APPROVAL II

**LYNN UNIVERSITY**  
**3601 North Military Trail**  
**Boca Raton, FL 33431-5598**

**Via Email:** [REDACTED]

November 8, 2011

Jennifer Tinker  
 [REDACTED]

Dear Jennifer:

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Good luck in all your future endeavors!

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Dr. Theodore Wasserman

Dr. Theodore Wasserman

IRB Chair

Cc: Dr. G. Cox

File #2011-016

Dr. A. Kosniztky

Dr. V. Storey

/td

